

With regards of Frank Tweedy

F L O R A

OF THE

YELLOWSTONE NATIONAL PARK.

BY

FRANK TWEEDY.

FLORA

OF THE

YELLOWSTONE NATIONAL PARK.

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BY

FRANK TWEEEDY.

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PREFACE.

IN the following general notes on the flora of the Yellowstone National Park but little has been attempted *beyond an enumeration* of the Flowering Plants (Phænogamia) and Vascular Cryptogams (Pteridophyta).

The list of plants has been compiled from the following sources, neglecting a few species in the older collections, of doubtful synonymy:—

A collection of 605 species made by the author in the Yellowstone National Park during August and September, 1884, and June, July, August and September, 1885.

A collection made by Robert Adams, Jr., in 1871.

In U. S. Geol. Surv. Montana and adjacent Terr. F. V. Hayden. Wash., 1872.

By Prof. John M. Coulter in 1872.

In U. S. Geol. Surv. Montana, Idaho, Wyoming and Utah. F. V. Hayden. Wash., 1873.

By Dr. C. C. Parry in 1873.

In Reconnaissance of Northwestern Wyoming. Capt. W. A. Jones. Wash., 1874.

By Dr. W. H. Forwood in 1881.

In Report of Lieut. Gen. P. H. Sheridan of his Expedition through the Big Horn Mts., Yellowstone Park, etc. Wash., 1882.

By Dr. W. H. Forwood, in 1882.

In Report of an Exploration of parts of Wyoming, Idaho and Montana, made by Lieut. Gen. P. H. Sheridan. Wash., 1882.

The thanks of the author are due to DR. ASA GRAY, SERENO WATSON, WM. M. CANBY, PROF. C. S. SARGENT, DR. GEO. VASEY, F. L. SCRIBNER, M. S. BEBB, and WM. BOOTT, for the determination of nearly all the species of his collection.

FRANK TWEEDY.

WASHINGTON, D. C., *April 4, 1886.*

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YELLOWSTONE NATIONAL PARK.

TOPOGRAPHIC FEATURES.

The Yellowstone National Park, with the exception of a narrow strip two miles wide on the north and northwest in Montana, and on the southwest in Idaho, lies in the extreme northwest corner of Wyoming. It has a length north and south of sixty-two miles, and a breadth of fifty-four miles, containing about 3350 square miles. Aside from the wonderful geyser basins and hundreds of boiling springs, but few regions can compare with it in the variety of its topographic features:—Plateaus diversified by deep cañons, lakes, and ponds of the greatest beauty of outline; mountain ranges of every possible description, from the rounded massive form to those of the most rugged and precipitous character.

The central and southern portion of the Park is, for the most part, with the exception of the isolated Red Mountain Range in the extreme south, a high rolling, heavily timbered country, mainly plateau from 7500–10,000 feet in altitude, the latter height being reached only on the high volcanic plateaus in the extreme southeast.

In the northwest rises the Gallatin Range, culminating in Electric Peak, 11,000 feet above sea level. On the eastern border lie the rugged volcanic peaks of the Absaroka¹ or Yellowstone Range, reaching elevations of 10,800 feet on the north-

¹ Absaroka is the Indian name of the Crow Nation, whose reservation is on the eastern slope of this range of mountains.

east, and over 11,000 feet on the southeast. The continental divide crosses the Park in its southwestern part, and is generally broad, ill-defined, and heavily timbered throughout. It has an elevation of from 8000-9500 feet, at one point but 150 feet above Yellowstone Lake.

On the western slope of the divide are the tributaries of the Snake River—the Lewis Fork of the Columbia—and on the eastern those of the Missouri; the latter including the Madison and East Gallatin on the west and northwest, the Stinkingwater, a tributary of the Big Horn, on the southeast, and the Yellowstone River. The latter, which drains more than half (2000 sq. miles) the area of the Park, enters at the southeast corner at an elevation of 7900 feet, and flowing about northwest through Yellowstone Lake and the Grand Cañon, crosses the northern boundary at an altitude of 5300 feet. Yellowstone Lake (7740 feet), the largest lake at great elevation in North America, has a length and breadth of respectively twenty and fifteen miles, a depth of 300 feet, and an area of 150 square miles. The shore line, indented by several large bays, is over 100 miles.

The beautiful curves of the sandy beaches and crystal purity of its waters, make it an object of unusual interest. With the exception of the Yellowstone Range, rising from its eastern shore, it is surrounded by a generally low, heavily timbered country. A few miles southwest on the opposite slope of the continental divide, are the little gems of Heart, Lewis, and Shoshone Lakes, varying in length from three to six miles.

The Yellowstone River, from the southern boundary to the lake—fifteen miles—is a sluggish, tortuous stream, bordered by meadow and swamp two miles in width. The slopes down to the valley are bold and precipitous, the surrounding country being a high volcanic plateau of 10,000 feet altitude, and over. The spurs of the Yellowstone Range making down to the lake are heavily timbered, becoming less so towards the south. Pelican Creek, draining the south end of Mirror Lake Plateau, enters the lake near the outlet. Meadows from a half to a mile in width border the lower portion of its course. At the outlet of Yellowstone Lake on the west abuts the heavily timbered plateau of the Elephant Back (8500 feet), which running westward a few miles, splits into two parts, one merging into the continental divide on

the southwest, and the other turning to the northward forms a narrow divide between the Madison and Yellowstone, and broadening out, again divides, one branch sweeping around to the head of the Grand Cañon, and the other, much broken by lateral and transverse drainages, continuing northward nearly to the Mammoth Hot Springs. The low semicircular depression thus formed on the west bank of the Yellowstone, is known as Hayden Valley, and has formed a portion of the ancient Yellowstone Lake. It is drained mainly by Alum Creek.

At the head of the Grand Cañon are the Upper and Lower or Great Falls of the Yellowstone, half a mile apart; they are 108 and 309 feet in height. East of Alum Creek is the region of Sour Creek, broken by low, heavily timbered ridges, extending to Mirror Lake Plateau on the east. North of the Grand Cañon is the crescent-shaped Mt. Washburne Range, the opening towards the Yellowstone River, and drained by Tower Creek. The interior slopes of this crater-like area and the rhyolite plateau along Tower Creek are densely timbered, except about Antelope Creek. Broad and Deep Creeks, which have cut deep cañons in the plateau, enter the Yellowstone east of Mt. Washburne, and north of these are the slopes of Amethyst Mountain and Specimen Ridge. The East Fork, the main branch of the Yellowstone, joins it from the east about twenty miles above where the Yellowstone crosses the northern boundary of the Park at its junction with the Gardiner River. This portion of the main river is called the Third Cañon. It has little of the well-defined walls of the Grand Cañon. On the east rise precipitous granite slopes several thousand feet. On the west the country is much lower and has more of a plateau character, and here about Blacktail Deer Creek and on Mt. Evarts, are large grass-covered areas, interspersed with groves of timber, and extending, in some cases, up the northern slopes of the Mt. Washburne amphitheatre. The East Fork from its junction with the Yellowstone to Cache Creek—about sixteen miles—runs through an open grass-covered valley from 1–1½ miles in width. Its main branches—Slough, Soda Butte, Cache, Calfee and Miller Creeks, flow from the east, draining the Yellowstone Range. On the west it receives numerous small drainages from Specimen Ridge and the Mirror Lake Plateau. On both sides, as far as Cache Creek and above

it for a few miles on the east, the adjacent slopes are only partially forest-covered. Above Cache Creek the East Fork runs in a well-timbered cañon. The short streams from the Mirror Lake Plateau head in beautiful little grassy parks often of a hundred acres in extent. The valleys of the main stream and its principal tributaries, Slough and Soda Butte Creeks, are low within the boundaries of the Park, ranging in altitude from 6800-7500 feet, but the immediate slopes in the northeastern portion rise precipitously to ragged and bare peaks and ridges 10,000-10,800 feet in altitude. North of Slough Creek is an area of high, sparsely-timbered plateau. On the Gardiner River, four miles south of the northern boundary, is located the terraced group of the Mammoth Hot Springs. About here, and nearly around Swan Lake and Indian Creek, are large open grass-covered areas. The slopes of the Gallatin Range are well clothed with forest up to the timber line, which in the Park varies from 9400-9700 feet. The tops of the long ridges sloping westward are in some cases bare. From the Gallatin Range southward along the western border of the Park extends the Madison Plateau. Its southern limit is the Pitchstone Plateau (8700 ft.), at the base of which on the north and east lie Shoshone and Lewis Lakes. The very flat top of the plateau is more than half covered with grassy parks, but the sides are densely timbered. To the westward it slopes down to the low open swampy area of the Falls River Basin in the extreme southwest corner of the Park. On the Madison Plateau, as elsewhere throughout the region, are scattered small, open parks and meadows, but taken as a whole, it is heavily timbered, and is cut by numerous dry rocky cañons. It has an average altitude of about 8500 feet, and from Shoshone Lake it is traversed in a northwesterly direction by the continental divide. At the foot of the abrupt eastern slope of this plateau lie the Upper and Lower Geyser Basins in a wilderness of forest. The Fire-hole River draining these areas, flowing northward, meets the Gibbon River from the northeast, the latter draining the Norris Geyser Basin, and heading on the plateau northwest of the Washburne Range. These two streams uniting form the Madison, which, in its course westward, has cut a gorge nearly 2000 feet deep through the Madison Plateau.

Within the Park the Madison River has a drainage area of about 700 square miles.

The region of the Yellowstone Park has been the scene of great volcanic activity, the rocks being mainly of igneous origin with the exception of the Gallatin Range, which is in a great part sedimentary. The plateaus have been formed by great lava flows, principally rhyolite. The rugged Yellowstone Range is mainly composed of volcanic breccias and conglomerates. The principal geyser areas are those of the Upper and Lower Geyser Basins, Norris Geyser Basin, Shoshone Lake Geyser Basin and the Heart Lake Geyser Basin. Hundreds of boiling springs are scattered over the whole region and have formed extensive deposits, mainly calcareous, while those of the geysers are a form of silica called geyserite. The great quantities of silicified wood and size of many of the specimens would lead us to suppose that the ancient forests were of much greater magnificence than at present. The wonders of the Yellowstone have been so often described that the above brief sketch will be sufficient for a comparison of the flora with the principal topographic features.

The Yellowstone Park, like most mountain regions where terrestrial radiation is great, has during the summer months great extremes of diurnal temperature, although the day temperature is low, not generally above 75° Fahr. Frequent summer frosts are a characteristic feature. This coolness of climate, coupled with a high relative humidity, that is, for the Rocky Mountain region, accounts for the fact of its being densely timbered. A copious rain-fall is shown in marsh, spring, stream and lake. From observations taken at Yellowstone Lake (7740 feet) from July 15 to August 15, 1885, we obtain the following: Average of readings of minimum thermometer, which practically is the temperature at sunrise, 29·7; average of 2 P. M. readings, 65·6; average of readings of maximum thermometer from August 1 to August. 15, 68·3. The greatest recorded temperature was 78°, and the lowest 22°. The growing season over the main area of the Park is from about May 1st to Sept. 1st. The lower and dryer portions up to 7000 feet are in their greenest garb about July 1st, and the subalpine and alpine regions early in August. When in vigorous growth,

vegetation does not seem to be affected in the least by a temperature of 10° below freezing, but a little later in the season its effects are apparent, when the plants have lost much of their vitality. The change from the luxuriance of August to the decay of September is abrupt. Generally by Sept. 15th snow has fallen to lie upon the ground for a day or two.

FORESTS.

The Yellowstone Park lies in the Rocky Mountain belt of coniferous forests, geographically termed the Interior Pacific, and which trending northwestward, unites in northern Washington Territory with that of the Pacific coast, forming a broad belt which still farther north in British America merges into the northwest extension of the Atlantic forest. The common and most wide-spread tree of the Park is the Black Pine, *Pinus Murrayana*, Balf. (*P. contorta*, Dougl., var. *Murrayana*, Engelm.). It is the only tree forming extensive forests to the exclusion of other species. It reaches its greatest development on the dryer plateaus between 7000 and 8000 feet, here forming 90 per cent. of the forest. It is not generally over two feet in diameter, with a height of 60-100 feet, and is found from the lowest altitudes up to 9500 feet. Over the lower and dryer portions it is found with the Red Fir (*Pseudotsuga Douglasii*, Carr), and in higher and moist situations with more or less *Picea* and *Abies*.

It is the only tree here that seems to be able to reproduce itself to any extent after having been destroyed by fire, doubtless owing to the protection afforded the seeds by the hard and indestructible cones. In many burnt districts an almost impenetrable growth of young trees have sprung up. Probably 65 per cent. of the whole forest area is composed of the Black Pine.

Pinus flexilis, James, generally occupies the dry gravelly ridges from 7500 feet upward, especially above 8000 feet. At low elevations it grows with the Black Pine and higher with *Picea* and *Abies*. It is found as low as 6000 feet at the Mammoth Hot Springs with *Juniperus Virginiana*, these two species forming exclusively the timbered portion of the formation.

Pinus albicaulis, Englm. (*P. flexilis*, var. *albicaulis*, Englm.),

is found associated with *P. flexilis*, but ranges higher, being found scattered or in bunches on rocky and exposed ridges and summits at the upper limit of tree growth. It has been observed as low as 7500 feet mingled with *Pseudotsuga* and *Pinus Murrayana*, but *always* in such situations with *P. flexilis*. Although apparently common throughout the Park, it has not before been distinguished from the allied *P. flexilis*.

At a distance they closely resemble each other in general habit, except for a bunched or fox-tail appearance of the leaves of the former. Prof. Sargent says, that at Old Marias Pass in northwest Montana, heretofore the most eastern station known, *P. albicaulis* is readily distinguished from *P. flexilis* by the milk-white bark; but this characteristic which the author has also observed in Washington Territory, is nearly wanting in the Park. The chief points of difference lie in the cones; those of *P. albicaulis* when young are *brown-purple, not green*, with much thicker scales. We have observed throughout the Park that the cones of *P. albicaulis*, with hardly an exception, fall to pieces soon after maturity, probably due, as Prof. Sargent suggests, to the work of squirrels, so that a perfect cone is rarely found upon the ground, while those of *P. flexilis* remain intact. The leaves of the former are also shorter and stouter. The largest specimen seen was 5 feet in diameter and 60 feet in height, on Bison Peak, at an elevation of 9200 feet. These two pines form nearly 10 per cent. of the forest area.

Although the Yellow Pine, *Pinus ponderosa*, Dougl., var. *scopulorum*, Engelm. (the Rocky Mountain variety), occurs on all sides of the Park, it has not been detected within the borders, although it would naturally be expected about some of the low dry open areas. The greater portion of the region has too great an altitude and rain-fall.

The Douglas or Red Fir (*Pseudotsuga Douglasii*, Carr) is found up to 9000 feet, generally scattered over the dryer grassy ridges and slopes. Rarely it occupies exclusively small areas. The slope immediately west of the Mammoth Hot Springs for 700 feet upward is covered with this species alone. The largest trees observed had a diameter of 5 feet, but generally were stunted and more or less decayed.

The Balsam (*Abies subalpina*, Engelm.) ranks next to the

Black Pine in amount and distribution. It is found throughout in cool, moist situations, at low elevations on the northern slopes, and especially common on wet subalpine slopes and plateaus about the timber line, forming groves in the park-like openings. Moist plateaus above 8000 feet and the slopes and bottoms of deep cañons are forests of this species and *Picea Engelmanni*, these two trees forming at least 25 per cent. of the forest area of the Park. The Spruce (*Picea Engelmanni*, Engelm.) is associated with the Balsam. It is not of great size, rarely more than 2 or 3 feet in diameter, and does not form extensive forests as in the central Rocky Mountain region, and still farther northward in the mountain region of Montana becomes rare and of small size.

Picea alba, Link, which occurs in the Black Hills of Dakota and in northern Montana, reaching its greatest development in the Flathead Region, probably does not occur within the Park, although some of the cones of *Picea Engelmanni* show a transition into *P. alba*. This fact is suggestive, occurring, as it does, in a region between that of the greatest development of *P. Engelmanni* on the south, and *P. alba* on the north; although in northwest Montana, where both species occur, Prof. Sargent has observed the same fact, but they are found "at different elevations in different soils and never mingle."

Picea pungens, Engelm., doubtless does not enter into the Park forests. Specimens collected under the name of *Abies Menziesii*, Lindl., are probably forms of *Picea Engelmanni*.

The Red Cedar (*Juniperus Virginiana*, L.) grows along the Gardiner River, a few miles above the mouth and mingled with *Pinus flexilis* over the formation of the Mammoth Hot Springs. It is rare elsewhere.

Juniperus communis, L., var. *alpina*, Gaud, occurs sparingly on rocky slopes at low elevations and more frequently about the hot spring areas. On the moist slopes and along the streams of the lower grass-covered areas are frequently groves of *Populus tremuloides*, Michx. (Aspen). It was observed sparingly above 8000 feet. *Populus angustifolia*, James, was only seen on Cache Creek.

Of the shrubs that are common throughout may be mentioned, *Betula glandulosa*, Michx.; *Salix desertorum*, Rich., var. *Wolfii*,

Bebb, and a form of *Salix glauca*, L., and the following rather rare and local species: *Salix longifolia*, Muhl.; *Betula occidentalis*, Hook; *Alnus viridis*, D. C.; *A. incana*, Willd., var. *virescens*, Wats.; *Prunus demissa*, Walpers.; *Pyrus sambucifolia*, Cham. and Schlecht; *Amelanchier alnifolia*, Nutt.; *Ceanothus velutinus*, Dougl.; *Rhamnus alnifolia*, L'Her.

The timber trees of the region, with the exception of the widespread *Populus tremuloides* and *Juniperus Virginiana*, are western species, but several of the shrubs range across the continent.

The Park has suffered at various times from the ravages of fire. There is probably 100 square miles of burnt forest. Over a large portion of the region will be found masses of fallen timber in the green and standing forest, principally in that of *Abies* and *Picea*.

There are some areas of considerable extent which are not forest covered, and at lower elevations covered with a luxuriant growth of grass and more or less sage-brush. The most extensive of these are in the northeast portion, in the vicinity of the Mammoth Hot Springs, about the mouth of the East Fork, and along this stream.

The former, including the greater portion of the region of Mt. Evarts, Blacktail Deer Creek, Swan Lake and the upper West Gardiner, and generally covered with local drift, has an area of forty square miles, and is the southern extension of the dry timberless region of the valley of the Yellowstone. This with some interruptions extends to the East Fork. The latter comprising the valley of the East Fork to Cache Creek and the slopes on each side; the northern portion of Specimen Ridge and across the Yellowstone River about Antelope Creek has an area of fifty square miles, twenty of this belonging to the valley of the East Fork. Besides these are Hayden Valley, eighteen square miles; Upper and Lower Geyser Basins and East Fire-hole River, fifteen square miles; Pitchstone Plateau, Madison Plateau, and Falls River Basin, forty square miles; Valley of the Upper Yellowstone, thirty square miles, and tops of the subalpine and alpine plateaus, the slopes of which are densely timbered, along the Upper Yellowstone thirty square miles. Add to these about eighty square miles for all minor areas,

parks, meadows, regions above timber line, etc., and 180 square miles for lakes and ponds, we will have a total of 483 square miles, or about 14 per cent. of the area of the Park. We can therefore safely say that 86 per cent. of it is forest covered.

GENERAL FLORA OF THE REGION.

The flora of the Yellowstone Park, taken as a whole, is essentially that of a mountain region, although at some points on its borders and along the low-lying dryer valleys of the main streams are found a number of species which belong to the flora of the plains or more arid regions. The flora of the portion from 6000-8000 feet alt., which is mainly that of the larger open areas, has pretty much the same character. *Clematis Douglasii*, Hook.; *Silene Douglasii*, Hook.; *Cerastium arvense*, L.; *Arenaria congesta*, Nutt., var. *subcongesta*, Wats.; *Geum triflorum*, Pursh.; *Carum Gairdneri*, Benth and Hook.; *Galium boreale*, L.; *Balsamorhiza sagittata*, Nutt.; *Helianthella Douglasii*, T. and G.; *Achillea millefolium*, L.; *Onicis Drummondii*, Gray; *Troximon glaucum*, Nutt.; *Campanula rotundifolia*, L.; *Collinsia parviflora*, Dougl., and *Eriogonum umbellatum*, Torr, will be met with almost everywhere, and perhaps not so generally distributed *Lupinus sericus*, Pursh.; several species of *Astragalus* (*A. alpinus*, L.; *A. multiflorus*, Gray; *A. campestris*, Gray); *Solidago Missouriensis*, Nutt., and *S. canadensis*, L.; *Aster integrifolius*, Nutt., and *Frasera speciosa*, Dougl. Two species of Phlox, (*P. canescens*, T. and G.; *P. Douglasii*, Hook., var. *longifolia*, Gray), and *Penstemon* (*P. confertus*, Dougl., var. *cæruleo-purpureus*, Gray; *P. glaber*, Pursh.). Of the eight species of *Artemisia* found within the Park but three (*A. frigida*, Willd.; *A. tridentata*, Nutt.; *A. cana*, Pursh.), are common, the two latter being the predominant species of the limited sagebrush areas. Above 8000 feet will be found several *Asters* (*A. foliaceus*, Lindl.; *A. Engelmanni*, Gray; *A. elegans*, T. and G.), and *Erigerons* (*E. salsuginosus*, Gray; *E. macranthus*, Nutt.), and along the timber *Geranium incisum*, Nutt., and *G. Richardsonii*, Fisch. and Meyer. Scattered through the open woods will be seen *Arnica cordifolia*, Hook.; *A. latifolia*, Bong.; *Hiera-*

cium gracile, Hook.; *H. albiflorum*, Hook., and *Pedicularis racemosa*, Dougl.

In the dense and dry pine woods of much of the plateau region there is very little vegetation except the diminutive blueberry, *Vaccinium myrtillus*, L., var. *microphyllum*, Hook., which often occurs in vast quantities. The berries are *always light red*, and not "at first light red," as often described. It bears but little fruit in the Park region, and the same fact was observed with regard to the strawberry and bearberry, *Frageria vesca*, L., and *Arctostaphylos Uva-ursi*, Spreng.

Early in August the natural flower gardens of the subalpine slopes are in all their splendor of coloring. Scarlet and crimson *Castilleja* vie with blue and purple lupines, forget-me-nots, asters, erigerons and carpet-like masses of snow-white phlox. Mingled with these are golden yellow and orange flowers of every shade, *Sedum*, *Potentilla*, *Ivesia*, *Helianthella* and *Aplopappus*.

As most of the species which cross the continent do so on the north it is not surprising to find so many as we do in the flora of the Park.

The flora of the northern Rocky Mountains has many points in common with that of the Cascade Mountains; in fact above latitude 48° it is difficult to determine the limit between what belongs to one and what to the other. Southward the two floras become very distinct. We find some stragglers from the Pacific flora entering the Park, probably all by way of the northwest. *Pinus albicaulis*, Engelm., is a notable instance in the case of a forest tree, and besides this are the following: *Trautvetteria grandis*, Nutt.; *Ranunculus ornithorhyncus*, Hook.; *Antennaria flagellaris*, Gray; *Erigeron peucephyllus*, Gray; *Hulsea nana*, Gray, and *Oryzopsis exigua*, Thurb.

The local *Subularia aquatica*, L., whose next eastern stations are lakes in Maine and New Hampshire, is common about Yellowstone Lake.

Myosurus apetalus, Gay, var. *lepturus*, Gray; *Mimulus montioides*, Gray, and *Nemophila breviflora*, Gray, come from the southwest, and *Cnicus Hookerianus*, Gray, from the Rocky Mountains further north. The nearest known localities for *Eriophorum russeolum*, Fries, are Hudson's Bay and Alaska.

We also find *Elatine triandra*, Schkuhr., and *Flærkea proserpinacoides*, Willd.

The genus *Arnica* is well represented in the Park, all the seven species of the Rocky Mountains between New Mexico and the British boundary have been found. Of *Arabis*, six out of eight species, half of the dozen or so species of *Ribes*, and eight of the ten species of *Epilobium*. All the species of the following genera have been collected, *Lonicera* (4), *Veronica* (6), *Habenaria* (4), and *Luzula* (4). The order *Compositæ*, which in North America comprises an eighth of Phænogamous Plants, in the limited area of the Park has, as far as known, 38 genera and 108 species, or about one-sixth of the whole. The ferns are meagrely represented by only six species, and these for the most part are rare and local.

ALPINE FLORA.

As far as observed the alpine flora of the Park contains about the same proportion of arctic species as that of the whole Rocky Mountain region within the United States. In the latter case out of about 190 species, 55 per cent. belong to the arctic flora. In other words, this alpine flora, like that of the whole temperate zone in the northern hemisphere, is a southern extension of arctic vegetation. The appearance of these arctic forms is looked for in the general refrigeration which brought on the glacial period. Pushed southward by the extreme cold, and then, as the climate moderated, retreating northward, following the receding glaciers, they were left stranded on the mountain summits, and finding a congenial home, have there persisted. In the list of the alpine flora given below, those which are arctic are marked thus (*). It will be seen that the Rocky Mountain arctic alpine flora is pretty well represented, considering the limited area under consideration, with the exception of the Gentians, which are entirely wanting as far as observed.

Ranunculus nivalis, L., var. *Eschscholtzii*, Watson.

**Draba alpina*, L.

Draba crassifolia, Graham.

Draba aurea, Vahl.

- * *Smelowskia calycina*, C. A. Meyer.
- * *Thlaspi alpestre*, L.
- * *Silene acaulis*, L.
- * *Arenaria verna*, L., var. *hirta*, Wats.
- * *Arenaria biflora*, var. *obtus*a, Wats.
- * *Arenaria stricta*, Wats.
 - Sagina Linnæi*, Presl.
 - Calandrinia pygmæa*, Gray.
 - Trifolium Parryi*, Gray.
- * *Astragalus alpinus*, L.
- * *Dryas octopetala*, L.
 - Ivesia Gordoni*, Torr and Gray.
- * *Sibbaldia procumbens*, L.
 - Saxifraga Jamesii*, Torr.
- * *Saxifraga oppositifolia*, L.
- * *Saxifraga cæspitosa*, L.
- * *Saxifraga rivularis*, L.
- * *Saxifraga nivalis*, L.
- * *Saxifraga punctata*, L.
 - Sedum rhodanthum*, Gray.
- * *Epilobium latifolium*, L.
 - Aplopappus Lyallii*, Gray.
- * *Erigeron uniflorus*, L.
 - Erigeron ursinus*, Eaton.
 - Erigeron radicans*, Hook.
- * *Antennaria alpina*, Gærtn.
 - Artemisia scopulorum*, Gray.
 - Senecio Fremonti*, Torr and Gray.
 - Hulsea nana*, Gray.
- * *Taraxacum officinale*, Weber, var. *scopulorum*, Gray.
 - Bryanthus empetrifomis*, Gray.
 - Douglasia montana*, Gray.
 - Polemonium confertum*, Gray.
- * *Polemonium humile*, Willd., var. *pulchellum*, Gray.
- * *Omphalodes nana*, Gray, var. *aretioides*, Gray.
 - Mertensia alpina*, Don.
- * *Veronica alpina*, L.
- * *Castilleja pallida*, Kunth, var. *septentrionalis*, Gray.
 - Penstemon Menziesii*, Hook.

Pedicularis Parryi, Gray.

Pedicularis scopulorum, Gray.

Pedicularis Grænlantica, Retz.

**Oxyria digyna*, Campdera.

**Polygonum viviparum*, L.

**Salix arctica*, R. Br., var. *petræa*, Anders.

**Salix reticulata*, L.

Habenaria obtusata, Richardson.

**Lloydia serotina*, Reich.

**Luzula spicata*, Desv.

Juncus Drummondii, E. Meyer.

Juncus Parryi, Engelm.

Carex scirpoidea, Michx.

Carex concinna, R. Br.

**Carex rigida*, Good.

**Carex atrata*, L.

**Carex alpina*, Swartz.

**Festuca ovina*, L., var. *brevifolia*, Wats.

*? *Alopecurus occidentalis*, Scribn.

**Pleum alpinum*, L.

**Trisetum subspicatum*, Beauv.

*? *Poa reflexa*, V. and S.

**Poa alpina*, L.

FLORA OF THE BOGS, PONDS AND STREAMS.

From the plateau nature of a great portion of the Park, the water from the great accumulations of snow drains off slowly, and in consequence bogs are scattered over the whole region, which in their saturated condition are mostly impassable before July 1st.

The bog and wet meadow flora from about 7500-9000 feet is luxuriant and of a generally uniform character. There are several species of *Stellaria* (*S. umbellata*, Turcz.; *S. longipes*, Goldie; *S. borealis*, Bigelow); *Saxifraga* (*S. punctata*, L.; *S. integrifolia*, Hook); *Valeriana* (*V. edulis*, Nutt.; *V. sylvatica*, Banks); *Potentilla* (*P. dissecta*, Pursh; *P. gracilis*, Dougl.; *P. fruticosa*, L.); *Senecio* (*S. triangularis*, Hook; *S. crassulus*, Gray; *S. lugens*, Rich.); *Polygonum* (*P. Bistorta*, L.; *P. vivi-*

parum, L.); *Habenaria* (*H. hyperborea*, R. Br.; *H. dilatata*, Gray); and *Allium* (*A. Schænoprasum*, L.; *A. brevistylum*, Wats.). Among other characteristic species are *Trifolium longipes*, Nutt.; *Pedicularis Grœnlandica*, Retz.; *Rumex paucifolius*, Nutt., and *Zygadenus elegans*, Pursh. Here, as elsewhere, especially over the hot spring and geyser areas, the small streams are bordered with *Parnassia fimbriata*, Banks; *Gentiana serrata*, Gunner, and *Mimulus luteus*, L.

Among the water plants of the Park we find a few of which the Rocky Mountain region is the eastern or western limit, but by far the greater portion, at least 70 per cent. of the species, extend across the continent. Water plants, from the more uniform nature of their surroundings in water, which also is an important factor in their distribution, would naturally have a more extensive range than land plants, which over a large area would be subjected to great differences in soil and climate.

Of this flora of the ponds and streams we find *Ranunculus aquatilis*, L., var. *trichophyllus*, Chaix., almost everywhere, and *R. multifidus*, Pursh., more rarely about Yellowstone Lake. *Nuphar advena*, Ait., is rarely absent from muddy ponds and sluggish streams, and frequently associated with great quantities of *Hippuris vulgaris*, L., and *Ceratophyllum demersum*, L.; *Nuphar polysepalum*, Engelm., was collected only in the Gibbon Lakes. *Sparganium simplex*, Huds., var. *angustifolium*, Engelm.; *Sagittaria variabilis*, Engelm., and *Utricularia vulgaris*, L., though frequent, are rarely seen in flower or fruit. Of the three *Lemnas* (*L. trisulca*, L.; *L. minor*, L.; *L. gibba*, L.), the two former are extremely abundant in many localities. Several *Potamogetons* (*P. rufescens*, Schrad.; *P. gramineus*, L., var. *maximus*; *P. perfoliatus*, L.; *P. pectinatus*, L., and var. *latifolius*, Robbins), are common throughout in the lakes and streams. *Subularia aquatica*, L., and *Isoëtes Bolanderi*, Engelm., are found on the bottom of ponds about Yellowstone Lake, the latter species being pretty generally distributed over the region. What is apparently the rare and local *Isoëtes pygmæa*, Engelm., has been found at Yellowstone Lake. *Callitriche autumnalis*, L., is abundant, and less so *C. verna*, L. Besides these may be mentioned *Zanichellia palustris*, L.; *Ruppia maritima*, L.; *Marsilia vestita*, Hook and Grev.; *Myriophyllum verticillatum*,

L., and *Polygonum amphibium*, L. At the outlet of Yellowstone Lake is a small pond a few feet in depth and several acres in extent, which is remarkable for containing a great number of the rare and local species of the region. On the bottom and submerged grow *Subularia aquatica*, L.; *Elatine triandra*, Sehkuhr.; *Isoëtes Bolanderi*, Engelm., and *Callitriche autumnalis*, L. Floating on the surface are *Ranunculus multifidus*, Pursh.; *Polygonum amphibium*, L.; *Sagittaria*, *Sparganium*, several *Lemnæ* and *Potamogetons*. In the mud at the water's edge were collected *Elatine Americana*, Arn.; *Tillæa angustifolia*, Nutt.; *Krynitzkia Californica*, Gray, and *Limosella aquatica*, L.

FLORA OF THE HOT SPRINGS AND GEYSER AREAS.

The alkaline nature of the soil and artificial warmth of the hot spring and geyser areas have created a flora in many respects peculiar to itself. In the list given below those species marked (*) have not been observed, with a very few exceptions, on other than hot spring soil. It will be seen that there are a number normal on our sea coasts, and more or less in saline situations in the interior, such as *Salicornia herbacea*, L.; *Rumex maritimus*, L., and *Triglochin maritimum*, L., and others which belong to the flora of a lower and more arid region. The bleak formations proper support but a scanty vegetation, but where overlaid with soil on its borders, and around less active rents, and especially along the hot streams, there will be found a most luxuriant vegetation. The most characteristic species are *Chrysopsis villosa*, Nutt.; *Gnaphalium Sprengelii*, Hook and Arn.; *Triglochin maritimum*, L., and a grass *Panicum dichotomum*, L., var. *pubescens*. The latter frequently covers the ground with a dense velvet carpet, glistening with crystal drops of condensed steam. *Ruppia maritima* has been observed in situations where the water had a temperature of 90° Fahr. The small streams are filled with *Potamogeton pectinatus*, L., and frequently with vast quantities of *Lemna*.

Botrychium ternatum, Swartz, var. *australe*, Eaton, has never

been observed out of hot spring soil. *Spraguea umbellata*, Torr, finds a congenial home on the bare geyserite, and in the same case though more local are *Aplopappus uniflorus*, Torr and Gray; *Mimulus nanus*, Hook and Arn.; *Castilleia minor*, Gray; *Orthocarpus luteus*, Nutt., and *Glyceria airoides*, Thurb.

- Spraguea umbellata*, Torr.
- * *Chrysopsis villosa*, Nutt.
- * *Aplopappus uniflorus*, Torr and Gray.
- Chænactis Douglasii*, Hook and Arn.
- * *Gnaphalium Sprengelii*, Hook and Arn.
- Senecio canus*, Hook.
- Arctostaphylos Uva-ursi*, Spreng.
- * *Mimulus nanus*, Hook and Arn.
- * *Castilleia minor*, Gray.
- * *Orthocarpus luteus*, Nutt.
- * *Lycopus Virginicus*, L., var. *pauciflorus*, Benth.
- * *Brunella vulgaris*, L.
- Chenopodium glaucum*, L.
- Chenopodium capitatum*, Wats.
- Monolepis chenopodioides*, Moq.
- * *Salicornia herbacea*, L.
- * *Eriogonum flavum*, Nutt.
- * *Rumex maritimus*, L.
- Euphorbia serpyllifolia*, Pers.
- * *Juncus tenuis*, Willd., var. *congestus*, Englm.
- * *Ruppia maritima*, L.
- Potamogeton pectinatus*, L.
- * *Trilochin maritimum*, L.
- Eleocharis palustris*, R. Br.
- Eleocharis olivacea*, Torr.
- * *Panicum dichotomum*, L., var. *pubescens*.
- * *Spartina gracilis*, Trin.
- * *Glyceria airoides*, Thurb.
- Juniperus communis*, L., var. *alpina*, Gaud.
- * *Botrychium ternatum*, Swartz, var. *australe*, Eaton.
- Pteris aquilina*, L.

THE GRASSES.

The open areas of the Park, up to 9000 feet alt., are covered with a luxuriant growth of the most nutritious grasses, the predominant species being mainly those known as "bunch grasses." None of the so-called "buffalo" or "grama grasses," *Buckloë*, *Bouteloua*, etc., are found. In all about seventy species are known, but only about half of these enter to any extent into the composition of the grass areas.

Over the dryer portions, up to 7000 feet alt., the following are the common forms, and of these the *Stipas*, *Agropyrum*s and *Poa tenuifolia* form at least 80 per cent.

Stipa viridula, Trin.
Stipa comata, Trin. and Rupr.
Agrostis scabra, Willd.
Koeleria cristata, Pers.
Melica spectabile, Scribn.
Poa tenuifolia, Buckl.
Bromus breviaristatus, Buckl.
Agropyrum divergens, Nees.
Agropyrum caninum, L.
Elymus Sitanion, Schultz.

At still higher altitudes, or in more moist situations, will be added *Deyeuxia Canadensis*, Beauv.; *D. neglecta*, Kunth.; *Trisetum subspicatum*, Beauv.; var. *molle*, Gray; *Poa Nevadensis*, Vasey; *P. memorialis*, L.; *Bromus Kalmii*, Gray; *B. ciliatus*, L.; *Deschampsia cæspitosa*, Beauv. The characteristic species of moist meadows and bogs is *Poa Nevadensis* in various forms.

Gradually many of the common species of the lower and dryer areas disappearing being replaced by others until at about 8500 feet alt. we find an abundant, but in many respects, quite distinct flora, beyond which point there is a decrease both in luxuriance and number of species.

In the moist meadows between 8000 and 9000 feet alt., the following will be found, including several Arctic forms :—

Hierochloa borealis, R. and S.
Alopecurus occidentalis, Scribn.
Phleum alpinum, L.
Agrostis humilis, Vasey.
Deyeuxia Canadensis, Beauv.
Deyeuxia Langsdorffii, Kunth.
Trisetum subspicatum, R. Br., var. *molle*, Gray.
Poa reflexa, V. and S.
Poa nemoralis, L.
Poa Nevadensis, Vasey.
Poa alpina, L.
Poa tenuifolia, Buckl.
Festuca ovina, L.
Hordeum nodosum, L.

As far as observed the only strictly alpine species are *Agropyrum Scribneri*, Vasey, and *Festuca ovina*, L., var. *brevifolia*, Wats., although several of the Poas and others, *Poa alpina*, *P. reflexa*, and forms of *P. tenuifolia* are found above the timber line on exposed ridges and summits.

Here, as elsewhere in the northwest, one is struck by the great development of the genus *Poa*, of which at least a dozen species grow within the Park. The great variety of forms are puzzling in the extreme.

CATALOGUE.

PHÆNOGAMIA (FLOWERING PLANTS).

RANUNCULACEÆ.

Clematis Douglasii, Hook.

Grassy slopes, 6500-8000 ft. alt. Common, especially in the northern portion of the park.

Clematis verticillaris, DC.

Open woods. Mammoth Hot Springs, 6400 ft. alt. Rare.

Anemone patens, L., var. *Nuttalliana*, Gray.

Mt. Washburne, 9200 ft. alt.; East Fork of the Yellowstone, 6200 ft. alt. Rare.

Anemone multifida, Poir.

Swan Lake, 7400 ft. alt.; Mt. Washburne, 9300 feet; Cache Creek, 6900 ft. alt. Common.

Thalictrum Fendleri, Engelm.

Antelope Creek, 8000 ft. alt.; Red Mountain, 9600 ft. alt. (Coulter).

Trautvettaria grandis, Nutt.

Pine woods, Lewis Lake, 7600 ft. alt. Rare.

Myosurus apetalus, Gay, var. *lepturus*, Gray (*M. aristatus*, Benth.), Gray, in Torr. Bull., xiii, i, p. 2.

Dry benches along East Fork of the Yellowstone, 6600 ft. alt. Rare.

Ranunculus aquatilis, var. *trichophyllus*, Chaix.

Common in streams and ponds up to 8000 ft. alt.

Ranunculus Flammula, L., var. *reptans*, Gray.

Indian Creek, 7800 ft. alt.; Mirror Lake Plateau, 8700 ft. alt.; Mud Springs (Adams).

Ranunculus cymbalaria, Pursh.

Mammoth Hot Springs, 6300 ft. alt. ; Lower Geyser Basin, 7100 ft. alt.

Ranunculus glaberrimus, Hook.

Swan Lake, 7600 ft. alt. ; High slopes, Slough Creek, 9100 ft. alt.

Ranunculus nivalis, L., var. *Eschscholtzii*, Wats.

Fawn Creek, 7400 ft. alt. ; Yellowstone Lake (Coulter).

A *Ranunculus* (909) and the same as Parry's No. 8, Stinkingwater, was collected in flower on Baronett Ridge, 9500 ft. alt., about snow banks, probably distinct from the above, and which Dr. Gray says may prove to be a new species.

Ranunculus sceleratus, L.

Mammoth Hot Springs, 6200 ft. alt. Infrequent.

Ranunculus affinis, R. Br.

Subalpine wet slopes. Mt. Holmes, 9300 ft. alt. (dwarf form, fls. an inch in diameter.) Mammoth Hot Springs, 6400 ft. alt. (tall form with small fls., near var. *leiocarpus*, Trantv.).

Ranunculus Nelsoni, Gray.

Yellowstone Lake (Adams).

Ranunculus orthorhyncus, Hook.

Bogs. Mammoth Hot Springs. Rare.

Ranunculus repens, L.

Mammoth Hot Springs, 6200 ft. alt. ; Upper Falls of the Yellowstone (Adams).

Ranunculus multifidus, Pursh.

Ponds. Outlet of Yellowstone Lake and Stevenson Island. Rare.

Caltha leptosepala, DC.

High bogs. Slough Creek, 9000 ft. alt. ; Pebble Creek, 9200 ft. alt. ; Upper Falls of the Yellowstone (Adams). Rather common.

Trillium laxis, Salisb., var. *albiflorus*, Gray.

Wooded bogs. Swan Lake, 7400 ft. alt. ; Buffalo Creek, with *Caltha leptosepala*, 9000 ft. alt. ; Upper Falls of the Yellowstone (Adams).

Aquilegia cœrulea, James.

Yellowstone Lake (Adams).

Aquilegia flavescens, Watson.

Mt. Washburne, 8500 ft. alt. ; Blacktail Deer Creek, 7600 ft. alt. ; Mud Springs (Adams); Yellowstone Lake (Coulter). Common.

Delphinium Menziesii, DC.

Wet meadows. Mirror Lake Plateau, 9000 ft. alt. ; Soda Butte, 6900 ft. alt. Rather rare.

Delphinium bicolor, Nutt.

Dry benches at low elevations. Mammoth Hot Springs, 6200 ft. alt. ; East Fork of the Yellowstone, 6000 ft. alt.

Delphinium scopulorum, Gray.

Bogs and along mountain streams, 8000-9500 ft. alt. Sometimes 6 feet in height. Common.

Aconitum Columbianum, Nutt. (*A. nasutum*, Hook).

Rather common in bogs and along mountain streams. Indian Creek, 8000 feet; East Pelican Creek, 8800 ft. alt.; Yellowstone Lake (Coulter, Adams).

Actæa spicata, L., var. *arguta*, Torr.

Damp woods. Pebble Creek, 8000 ft. alt; Yellowstone Lake (Adams). Rare.

BERBERIDACEÆ.**Berberis repens**, Lindl.

Amethyst Creek, 6700 ft. alt. ; Sulphur Hills, 7700 ft. alt. ; Lower Geyser Basin (Coulter). Frequent.

NYMPHÆACEÆ.**Nuphar advena**, Ait.

Abundant in ponds and sluggish streams up to 8500 ft. alt.

Nuphar polysepalum, Engelm.

Ponds head of Gibbon River, 8000 ft. alt. Rare.

FUMARIACEÆ.**Corydalis aurea**, Willd., var. *occidentalis*, Engelm.

Soda Butte Creek, 8000 ft. alt. ; Yellowstone Lake (Coulter). Rather rare.

CRUCIFERÆ.**Draba crassifolia**, Graham.

Mt. Holmes, 9200 ft. alt. ; Mt. Washburne, 10,000 ft. alt.

Draba alpina, L.

Mt. Washburne, 9800 ft. alt. ; Stinkingwater Pass (Parry).

Draba alpina, L., var. *glacialis*, Dickie.

Mammoth Hot Springs, 7000 ft. alt. ; Sepulchre Mt., 8600 ft. alt. ; Mt. Doane, 10,000 feet (Adams).

Draba nemorosa, L.

Mammoth Hot Springs ; Slough Creek, 1800 ft. alt. Frequent.

Draba nemorosa, L., var. *leiocarpa*, Lindb.

Yellowstone Lake and Upper Falls of the Yellowstone (Adams).

Draba nemorosa, L., var. *hebecarpa*, Lindb.

Cache Creek, 7900 ft. alt. ; Swan Lake, 7400 ft. alt.

Draba aurea, Vahl.

Soda Butte Creek, 7400 ft. alt. Rare.

Cardamine cordifolia, Gray.

Bogs. Indian Creek, 8000 ft. alt.

Cardamine Breweri, Watson.

Upper Falls of the Yellowstone (Adams).

Cardamine hirsuta, L.

Yellowstone Lake (Coulter) ; Mirror Lake Plateau, 9000 ft. alt.
Small forms, 2-4 inches high.

Arabis perfoliata, Lam.

Gardiner River, 5500 ft. alt. ; Slough Creek, 6800 ft. alt. Infrequent.

Arabis hirsuta, Scop.

Mammoth Hot Springs, 6300 ft. alt. ; Gardiner River, 5400 ft. alt.
Frequent.

Arabis spathulata, Nutt.

Grassy hills. Fawn Creek, 8000 ft. alt. Rare.

Arabis Drummondii, Gray.

Mt. Washburne, 8400 ft. alt. ; Stinkingwater Pass (Parry) ; Yellowstone Lake (Adams).

Arabis Lyallii, Watson.

Mt. Washburne, 9800 ft. alt. ; Rocks, Slough Creek, 7000 ft. alt. ;
Mt. Doane (Adams).

Arabis Holbøllii, Hornem.

Gardiner River, 5600 ft. alt. ; Shoshone Lake (Coulter). Not common.

Thelypodium integrifolium, Endl.

Mammoth Hot Springs, 6200 ft. alt. ; Hot Sulphur Springs (Adams).

Thelypodium sagittatum, Endl.

Meadows. West Pelican Creek, 8000 ft. alt.; Yellowstone Lake (Coulter). Rare.

Erysimum asperum, DC., var. *inconspicuum*, Wats.

Dry bench lands. East Fork of the Yellowstone, 6500 ft. alt.; Slough Creek, 6800 feet.

Barbarea vulgaris, R. Br.

Mammoth Hot Springs, 6100 ft. alt.; Blacktail Deer Creek, 7200 ft. alt. Rare.

Sisymbrium canescens, Nutt.

Yellowstone Lake (Adams).

Sisymbrium incisum, Engelm.

Dry bench lands. Common.

Smelowskia calycina, C. A. Meyer.

Common on alpine summits. Mt. Holmes, 10,000 ft. alt.; Mt. Washburne, 8800 ft. alt.; Saddle Mt., 9800 ft. alt.; Stinkingwater Pass (Parry).

Nasturtium obtusum, Nutt.

Indian Creek, 8000 ft. alt.; Lower Falls of the Yellowstone (Coulter).

Nasturtium curvisiliqua, Nutt., var. *lyratum*, Watson.

Mammoth Hot Springs, 6800 ft. alt.; Mirror Lake Plateau, 8900 ft. alt., Yellowstone (Parry).

Subularia aquatica, L.

Growing submerged in ponds at the foot of Yellowstone Lake. "In great abundance at head of Yellowstone Lake" (Parry); Yellowstone Lake (Forwood).

Thlaspi alpestre, L.

Indian Creek, 8200 ft. alt.

Lepidium intermedium, Gray.

Common in the dryer valleys.

Physaria didymocarpa, Gray.

Mammoth Hot Springs. Rare.

VIOLACEÆ.

Viola blanda, Willd.

Wet meadows, Buffalo Creek, 8600 ft. alt. Rare.

Viola canina, L., var. *rupestris*, Regel.

Rather common in meadows from 6000–8000 ft. alt.; Slough Creek, 7700 ft. alt.; Swan Lake, 7500 ft. alt.; Pelican Creek, 8200 ft. alt.

Viola Canadensis, L.

Soda Butte Creek, 8200 ft. alt. Rare.

Viola Nuttallii, Pursh.

Mammoth Hot Springs, 6400 ft. alt. Rare.

CARYOPHYLLACEÆ.

Silene Douglasii, Hook.

Grassy slopes, 7600–9000 ft. alt. Common.

Silene acaulis, L.

Rather common on alpine summits. Mt. Holmes, 10,000 ft. alt.; Mt. Chittenden, 9800 ft. alt. "Mountains along Yellowstone Lake" (Adams).

Lychnis Drummondii, Wats.

Wooded slopes, Pebble Creek, 8000 ft. alt.; Yellowstone and Heart Lakes (Coulter); Upper Falls of the Yellowstone (Adams).

Lychnis Parryi, Wats.

Grassy slopes with *Silene Douglasii*. Rather common

Cerastium arvense, L.

Very common, from 6000–10,000 ft. alt.

Stellaria umbellata, Turcz.

Common in bogs, from 6000–9000 ft. alt.

Stellaria longipes, Goldie.

With the preceding. Rather dry places, Bison Peak, 8800 ft. alt. (a very glaucous form).

Stellaria crassifolia, Ehrhart.

Mt. Washburne, 9600 ft. alt. Rare.

Stellaria borealis, Bigelow.

Open and wooded bogs. Indian Creek, 8000 ft. alt.; Upper Falls of the Yellowstone (Adams).

Arenaria congesta, Nutt., var. *subcongesta*, Watson.

Very common everywhere, from 6500–9500 ft. alt.

Arenaria pungens, Nutt.

Bare gravelly ridges, Mt. Norris, 9800 ft. alt.

Arenaria verna, L., var. *hirta*, Watson.

Bed of dry creek, Soda Butte, 7500 ft. alt.; Mt. Holmes, 10,000 ft. alt.

Arenaria biflora, var. *obtus*a, Watson (*A. arctica*, Stev. of Hayd. Rep. for 1871-72).

Common on alpine summits. Mt. Holmes, 10,000 ft. alt.; Saddle Mt., 10,200 ft. alt.; "High peaks near Yellowstone Lake" (Coulter); Red Mt., 10,000 ft. alt. (Adams).

Arenaria stricta, Watson.

Mt. Washburne, 9800 ft. alt.; Mt. Norris, 9000 ft. alt. Not common.

Arenaria lateriflora, L.

Grassy slopes, Slough and Pebble Creeks, 6500-8000 ft. alt. Rare.

Sagina Linnæi, Presl.

Rather common in wet places at middle elevations. Fawn Creek, 7400 ft. alt.; Lower Geyser Basin (Coulter); Mud Springs (Adams).

PORTULACACEÆ.

Calandrinia pygmæa, Gray.

Generally on bare wet subalpine and alpine slopes. Mt. Holmes, 9300 ft. alt.; Sepulchre Mt., 8200 ft. alt.; Red Mt., 10,000 ft. alt., and Tower Falls, 6500 ft. alt. (Coulter).

Claytonia Chamissonis, Esch.

Gibbon Lake, 8000 ft. alt.; East Fork of the Yellowstone, 6500 ft. alt.; Yellowstone Lake (Coulter, Adams); Lower Falls of the Yellowstone (Coulter).

Claytonia Caroliniana, Michx., var. *sessilifolia*, Torr.

Common in wet places from 7000-9500 ft. alt.

Spraguea umbellata, Torr.

Common in dry and rocky places, especially on hot spring and geyser formation, from 6500 to 8500 ft. alt.

Lewisia rediviva, Pursh.

Mammoth Hot Springs, 6200 ft. alt.; Yellowstone Lake (Adams). Rare within the Park limits.

ELATINACEÆ.

Elatine triandra, Schkuhr.

Bottom of ponds at outlet of Yellowstone Lake with *Isoetes Bolanderi* and *Subularia aquatica*.

Elatine Americana, Arn. (Trimerous form).

Muddy shore of ponds at outlet of Yellowstone Lake, with *Limosella aquatica* and *Tillæa angustifolia*.

MALVACEÆ.

Malvastrum coccineum, Gray.

Mammoth Hot Springs. Rare within the Park.

Sphæralcea rivularis, Torr.

Gibbon Cañon; Mammoth Hot Springs in open pine woods. Rare.

LINACEÆ.

Linum perenne, L.

Very common at low elevations. Petals sometimes white.

GERANIACEÆ.

Geranium Carolinianum, L.

Hot Sulphur Springs (Adams).

Geranium incisum, Nutt.

Very common on the border of woods up to 9000 ft. alt.

Geranium Richardsoni, Fisch. & Mey.

With the former, but less common. Petals apparently always white.

Flørkea proserpinacoides, Willd.

Around springs near Swan Lake. Rare.

RHAMNACEÆ.

Rhamnus alnifolia, L'Her.

Along upper East Fork of the Yellowstone, 7000 ft. alt. Rare.

Ceanothus velutinus, Dougl.

Rocky hills, Soda Butte, 8000 ft. alt. Rare.

SAPINDACEÆ.

Acer glabrum, Torr.

Wooded hills, Mammoth Hot Springs, 6500 ft. alt. Rare.

LEGUMINOSÆ.

Lupinus cæspitosus, Nutt.

Meadows and subalpine grassy slopes. Blacktail Deer Creek, 7200 ft. alt.; Mt. Washburne, 9600 ft. alt.; Mud Springs and Yellowstone Lake (Adams); Upper Falls of the Yellowstone (Parry). Rather Common.

Lupinus sericeus, Pursh.

Common throughout: Mammoth Hot Springs, 6000 ft. alt.; Blacktail Deer Creek, 7300 ft. alt.; Mt. Washburne, 9800 ft. alt.; Mt. Holmes, 10,000 ft. alt.

Lupinus argenteus, Pursh., var. *decumbens*, Wats.

With the preceding, but more frequent in meadows from 8500–9500 ft. alt.; Mammoth Hot Springs, 5900 ft. alt.; Mirror Lake Plateau, 8800 ft. alt.; Mud Springs and Yellowstone Lake (*L. laxiflorus*, Dougl., var. *tenellus*, T. and G.), Adams.

Lupinus Burkei, Watson.

Border of woods, Turbid Lake, 8000 ft. alt. Open pine woods, Mirror Lake Plateau, 8600 ft. alt.; Upper Falls of the Yellowstone (*L. polyphyllus*, Lindl.), Adams.

Lupinus pusillus, Pursh.

Mouth of Gardiner River, 5300 ft. alt. Rare within the Park.

Trifolium longipes, Nutt.

Very common in bogs and meadows from 6000–8500 ft. alt.

Trifolium Kingii, Watson (*T. Haydeni*, Porter).

Subalpine wet slopes. Mt. Holmes, 9600 ft. alt.

Trifolium Parryi, Gray.

With the preceding.

Astragalus caryocarpus, Ker.

Mammoth Hot Springs, 5800 ft. alt. Rare.

Astragalus Canadensis, L.

Blacktail Deer Creek, 7200 ft. alt.; Mammoth Hot Springs, 6200 ft. alt. Rare.

Astragalus hypoglottis, L.

Grassy places. Common in the northern portion of the Park.

Astragalus Drummondii, Dougl.

Mammoth Hot Springs, 6200 ft. alt.; Sepulchre Mt., 8000 ft. alt.; Cache Creek, 7600 ft. alt.; Gardiner River, 5700 ft. alt. Frequent.

Astragalus aboriginum, Rich.

Mt. Washburne, 10,000 ft. alt.; hills along Soda Butte Creek, 8000 ft. alt. Rare.

Astragalus oroboides, Hornem., var. *Americanus*, Gray.

Blacktail Deer Creek, 7300 ft. alt.; Slough Creek, 6600 ft. alt.

***Astragalus alpinus*, L.**

Common throughout grassy places and open woods, from 6000-9500 ft. alt.

***Astragalus Missouriensis*, Nutt.**

Dry rocky hills, mouth of Gardiner River, 5600 ft. alt.

***Astragalus Purshii*, Dougl.**

With the preceding.

***Astragalus triphyllus*, Pursh.**

With *A. Purshii*. The last three species not observed elsewhere in the Park.

***Astragalus frigidus*, Gray, var. *Americanus*, Watson.**

Grassy borders of streams and open woods. Blacktail Deer Creek, 7300 ft. alt. ; Soda Butte Creek, 7800 ft. alt. Rather rare.

***Astragalus campestris*, Gray.**

Border of pine woods. Very common from 6000-8000 ft. alt.

***Astragalus multiflorus*, Gray.**

Dry bench lands. Blacktail Deer Creek and Mt. Evarts, 7200-7800 ft. alt. ; Soda Butte Creek, 8000 ft. alt. ; Cache Creek, 6700 ft. alt.

***Astragalus tegetarius*, Wats.**

Mammoth Hot Springs, 6200 ft. alt.

***Astragalus tegetarius*, Wats., var. *implexus*, Canby.**

Bare rocky slopes and summits. Sepulchre Mt., 8600 ft. alt. ; Mt. Washburne, 10,000 ft. alt.

***Oxytropis deflexa*, D. C.**

Meadows along Blacktail Deer Creek, 7300 ft. alt. ; Mt. Washburne, 10,000 ft. alt. (a dwarf, stemless form, with leaves an inch and leaflets 2-3 lines long).

***Oxytropis viscida*, Nutt.**

Grassy slopes and summits of Specimen Ridge and Amethyst Mt., 8500-9000 ft. alt.

***Oxytropis lagopus*, Nutt.**

Common throughout. Bare rocky hills, Gardiner, 5 00 ft. alt. ; Mt. Washburne, 9800 ft. alt.

***Oxytropis Lamberti*, Pursh.**

Common from 5300 ft. alt. to alpine. Mouth of Gardiner River, 5400 ft. alt. ; Mt. Holmes, 10,000 ft. alt.

Hedysarum Mackenzii, Richard.

Mammoth Hot Springs, 6200 ft. alt. ; Gardiner Falls ; gravelly banks junction of Soda Butte Creek and East Fork of the Yellowstone, 6600 ft. alt.

Hedysarum boreale, Nutt.

Rather common in open pine woods, Sepulchre Mt., 8000 ft. alt. ; Slough Creek, 6700 ft. alt. ; East Fork of Pelican Creek, 8400 ft. alt.

ROSACEÆ.**Prunus demissa**, Walp.

Tower Falls. Rare.

Spiræa betulifolia, Pallas.

Open woods, not common. Mammoth Hot Springs, 6200 ft. alt. ; Hot Sulphur Springs and Upper Falls of the Yellowstone (Adams) ; Yellowstone (Parry).

Spiræa betulifolia, Pallas, var. *rosea*, Gray.

Shoshone Lake (Coulter).

Rubus Nutkanus, Moçino.

Rather rare in damp wooded slopes and ravines. Slough Creek, 8000 ft. alt. ; Cache Creek, 7800 ft. alt.

Rubus strigosus, Michx.

Blacktail Deer Creek, 7400 ft. alt. ; Obsidian Cañon, 7600 ft. alt. ; Heart Lake, 7500 ft. alt. ; Yellowstone Lake (Adams). Rather local.

Dryas octopetala, L.

On bare alpine summits. Mt. Holmes, 10,100 ft. alt. ; Summits at head of North Fork of Stinkingwater, 10,300 ft. alt. ; Slides, Soda Butte Creek, 8200 ft. alt.

Geum macrophyllum, Willd.

Common in bogs and meadows at low elevations. Gardiner River, 5600 ft. alt. ; Tower Falls, 6300 ft. alt.

Geum triflorum, Pursh.

With the preceding, but more frequently on dry slopes and banks.

Fragaria vesca, L.

Common in grassy places and open woods from 6000-8000 ft. alt. Producing very little fruit.

Potentilla glandulosa, Lindl.

Rather common, generally in dry and rocky places. Mirror Lake Plateau, 8600 ft. alt. ; Open woods Mammoth Hot Springs, 6400 ft. alt. ; Upper Falls of the Yellowstone (Adams).

Potentilla Norvegica, L.

Mud Springs and Upper Falls of the Yellowstone (Adams).

Potentilla rivalis, Nutt., var. *millegrana*, Watson (*P. millegrana*, Engelm.).

Sandy bluffs and shores of Yellowstone Lake, 7740 ft. alt.

Potentilla palustris, Scop.

Shoshone Lake (Forwood).

Potentilla Plattensis, Nutt.

Grassy summits of Specimen Ridge and Amethyst Mt., 8500-9400 ft. alt. ; Mt. Washburne, 9800 ft. alt. ; Stinkingwater Pass (Parry).

Potentilla dissecta, Pursh (*P. diversifolia*, Lehm.).

Meadows and alpine slopes, from 6500-10,000 ft. alt. Common, and varying much in size according to elevation.

Potentilla gracilis, Dougl.

Meadows from 7000-9000 ft. alt. Antelope Creek, 8000 ft. alt. ; Yellowstone Lake, 7740 ft. alt.

Potentilla gracilis, Dougl., var. *flabelliformis*, T. and G.

Mammoth Hot Springs, 6400 ft. alt. ; Cache Creek, 7800 ft. alt. In rather dryer situations than the last.

Potentilla gracilis, Dougl., var. *rigida*, Watson (*P. Nuttallii*, Lehm.).

Hot Sulphur Springs (Adams).

Potentilla fruticosa, L.

Common in bogs from 7000-9000 ft. alt.

Potentilla Anserina, L.

Wet places. Delusion Lake, 7800 ft. alt. ; Mirror Lake, 8900 ft. alt. ; Pelican Creek, 7800 ft. alt. ; Yellowstone Lake (Adams).

Sibbaldia procumbens, L.

Common on subalpine and alpine slopes and summits, but frequently at much lower elevations. Rocky hills, Slough Creek, 6800 ft. alt. ; Rocks, Pelican Creek, 8000 ft. alt.

Ivesia Gordoni, T. and G.

Alpine and subalpine. Very common.

Rosa Sayi, Schwein.

Wooded and open rocky places. Slough Creek, 6600 ft. alt.; Cache Creek, 7900 ft. alt.; Alum and Sour Creeks, 7700 ft. alt.; Yellowstone Lake, 7800 ft. alt. Common.

Rosa Arkansana, Porter.

Open woods, Mammoth Hot Springs, 6200 ft. alt.; Thickets, Soda Butte Creek, 7800 ft. alt. Rather rare.

Pyrus sambucifolia, Cham and Schlecht.

Sulphur Hills, Pelican Creek, 8200 ft. alt.; Gibbon Lakes, 8000 ft. alt.; Rare.

Amelanchier alnifolia, Nutt.

Open rocky places up to 7500 ft. alt. Bison Peak, 6800 ft. alt.; East Fork of the Yellowstone, 7400 ft. alt.; Yellowstone Lake (Coulter). Not common.

SAXIFRAGACEÆ.

Saxifraga oppositifolia, L.

High alpine. Mt. Holmes, 10,100 ft. alt.; Mt. Washburne, 10,000 ft. alt. Mountains along Yellowstone Lake (Adams).

Saxifraga cæspitosa, L.

Rocky, wet alpine slopes, near snow, North Fork of Stinkingwater, 10,200 ft. alt.

Saxifraga bronchialis, L.

Rocky knolls along Slough Creek, 6700 ft. alt.; Yellowstone Lake (Adams); Gallatin Range (W. H. Weed).

Saxifraga rivularis, L.

With *S. cæspitosa*, L.

Saxifraga punctata, L.

Bogs and wooded mountain streams. Common. Indian Creek, 8000 ft. alt.; Slough Creek, 7700 ft. alt.; Pelican Creek, 8200 ft. alt.; Yellowstone River (Coulter); Hot Sulphur Springs and Yellowstone Falls (Adams).

Saxifraga Jamesii, Torr.

Hot Sulphur Springs (Adams); National Park (Coulter's Bot. of the Rocky Mts.); Gallatin Range (W. H. Weed).

Saxifraga nivalis, L.

Wet slopes from 7500-9500 ft. alt.; Sepulchre Mt., 8000 ft. alt.; Mt. Washburne, 9300 ft. alt.

***Saxifraga integrifolia*, Hook.**

Meadows and bogs at rather lower elevations than the last. Swan Lake, 7300 ft. alt.

***Tellima pentandra*, Canby, ined.**

Grassy slopes, Soda Butte Creek, 8000 ft. alt. Rare.

***Tellima parviflora*, Hook.**

Grassy places, Mammoth Hot Springs, 6300 ft. alt.; Soda Butte Creek, 7800 ft. alt. Not common.

***Tellima tenella*, Watson.**

Rocky places, Cache Creek, 9000 ft. alt.; Specimen Ridge, 8400 ft. alt. Rare.

***Mitella pentandra*, Hook.**

Border of woods, Slough Creek, 6500 ft. alt.; Rocky places, Sour Creek, 8400 ft. alt.; Yellowstone Lake (Adams). Frequent.

***Mitella trifida*, Graham.**

Wooded slopes, Soda Butte Creek, 8000 ft. alt.; Mt. Washburne, 8800 ft. alt. Not rare.

***Heuchera cylindrica*, Dougl.**

Rocky open places, 6500-9000 ft. alt.; Soda Butte Creek, 8000 ft. alt.; Rocks, Slough Creek, 6700 ft. alt.; Hot Springs along the Yellowstone, 6200 ft. alt.; Grand Cañon of the Yellowstone, Lower Fire-hole Basin (Coulter).

***Heuchera parvifolia*, Nutt.**

Swan Lake, 7400 ft. alt.; Cache Creek, 7800 ft. alt.; Yellowstone Lake (Adams).

***Parnassia parviflora*, DC.**

Lower Fire-hole Basin (Coulter).

***Parnassia palustris*, L.**

Bogs, Soda Butte Creek, 7600 ft. alt.; Upper Falls of the Yellowstone (Adams).

***Parnassia fimbriata*, Banks.**

Open bogs and along streams from 6000-9000 ft. alt. Very common.

***Ribes oxycanthoides*, L.**

Frequent in cold bogs and along mountain streams, 7000-8500 ft. alt.

***Ribes lacustre*, Poir.**

Rocks, Bison Peak, 8700 ft. alt.; Yellowstone Lake (Adams); Yellowstone (Parry).

Ribes lacustre, Poir, var. *parvulum*, Gray.

Slough Creek, 6900 ft. alt.; Obsidian Cañon, 7600 ft. alt.

Ribes prostratum, L'Her.

Tower Falls, 6200 ft. alt.; Yellowstone Lake (Adams). Rare.

Ribes Hudsonianum, Richards.

Along streams, Antelope Creek, 6400 ft. alt.; Tower Falls, 6200 ft. alt.; Yellowstone Falls (Adams). Not common.

Ribes cereum, Dougl.

Dry, open rocky places, Junction Butte, 6200 ft. alt.; Yellowstone Lake (Adams). Rare.

Ribes viscosissimum, Pursh.

Rocky places and open-wooded slopes from 7000-9000 ft. alt.; Soda Butte, 7500 ft. alt.; Elephant Back, 9000 ft. alt.; Yellowstone (Parry-Forwood).

Ribes floridum, L.

Mammoth Hot Springs, 6200 ft. alt. Not common.

CRASSULACEÆ.

Tillæa angustifolia, Nutt.

Muddy shore of ponds, Yellowstone Lake with *Elatine Americana*.

Sedum rhodanthum, Gray.

Bogs, Cache Creek, 7000 ft. alt.; Gibbon Lakes, 8000 ft. alt.; Tower Falls (Coulter); Mud Springs, Yellowstone Lake and Upper Falls of the Yellowstone (Adams). Rather local.

Sedum stenopetalum, Pursh.

Very common throughout, 6000-10,000 ft. alt.

Sedum Douglasii, Hook.

"Divide between Snake River and Yellowstone Lake, 8800 ft. alt." (Adams).

HALORAGÆÆ.

Hippuris vulgaris, L.

In great quantities in sluggish streams and shallow ponds, 7500-8500 ft. alt.; Lewis Lake; Delusion Lake; Riddle Lake; head of Broad Creek.

Myriophyllum verticillatum, L.

Lakes, head of Broad Creek, 8400 ft. alt.

ONAGRACEÆ.

Epilobium spicatum, Lam.

Dry places, principally on the burnt areas. Mammoth Hot Springs, 6300 ft. alt.; Mirror Lake Plateau, 8800 ft. alt.; Alum Creek (Forwood); Mud Springs (Adams).

Epilobium latifolium, L.

Dry washes along Soda Butte Creek, 7700 ft. alt. Not common.

Epilobium suffruticosum, Nutt.

With the former. Yellowstone Lake and Upper Falls of the Yellowstone (Adams).

Epilobium alpinum, L.

Rather common on subalpine mountain slopes.

Epilobium coloratum, Muhl.

Alum Creek (Forwood); Mud Springs (Adams).

Epilobium Drummondii, Hausknecht (*E. organifolium*, Lam.).

"Hausknecht does not allow *E. organifolium*, Lam., to be American" (Watson). Coal bogs and mountain streams, 7500-9500 ft. alt.

Epilobium Hornemanni, Reich. (a form of *E. organifolium*, Lam.).

With the preceding.

Epilobium paniculatum, Nutt.

Dry, open grassy slopes. Soda Butte, 7000 ft. alt.

Gayophytum ramosissimum, Torr and Gray.

Very common on dry banks up to 8000 ft. alt.

Gayophytum racemosum, Torr and Gray.

With the preceding.

Ænothera biennis, L.

Hot Sulphur Springs and Yellowstone Lake (Adams).

Ænothera albicaulis, Nutt.

Mud Springs (Adams).

Ænothera cæspitosa, Nutt.

Dry rocky places. Mammoth Hot Springs, 6400 ft. alt. Rare.

Ænothera triloba, Nutt.

Yellowstone Lake (Coulter).

Ænothera brachycarpa, Gray (*Æ. marginata*, var. *purpurea*).

Hot Sulphur Springs (Adams); Hot Springs along the Yellowstone (Coulter).

Oenothera breviflora, Torr and Gray (*O. Nuttallii*, Torr and Gray).

Wet places. Swan Lake, 7400 ft. alt. ; Yellowstone (Parry, Forwood).

Oenothera heterantha, Nutt.

Swan Lake with the preceding, 7400 ft. alt. ; Blacktail Deer Creek, 7200 ft. alt.

LOASACEÆ.

Mentzelia dispersa, Wats.

Dry banks up to 7500 ft. alt. Frequent.

Mentzelia lævicaulis, T. and G.

Hot Sulphur Springs (Adams) ; Mammoth Hot Springs (W. H. Weed).

UMBELLIFERÆ.

Carum Gairdneri, Benth. and Hook.

Common in rather moist places, 6000–8500 ft. alt.

Berula angustifolia, Koch.

Alum Creek (Forwood).

Bupleurum ranunculoides, L.

Yellowstone (Parry).

Osmorrhiza nuda, Torr.

Rich, damp, open woods up to 9000 ft. alt. Common.

Angelica pinnata, Wats.

Bogs and banks of streams. Blacktail Deer Creek, 7300 ft. alt. ; East Fork of the Yellowstone, 8000 ft. alt. Rather common.

Angelica Lyallii, Wats.

With the preceding, but rather less common. Upper Geyser Basin, 7300 ft. alt.

Cymopterus alpinus, Gray.

Upper Falls of the Yellowstone (Adams).

Cymopterus montanus, Torr and Gray.

Rocky hills. Gardiner, 5600 ft. alt.

Peucedanum simplex, Nutt.

Sepulchre Mt., 8000 ft. alt.

Peucedanum ambiguum, Nutt.

Rocky ridges and slides. Slough Creek, 8700 ft. alt. ; Mt. Norris, 9000 ft. alt. Frequent.

Peucedanum macrocarpum, Nutt.

With the preceding. Gardiner, 5400 ft. alt.

Peucedanum nudicaule, Nutt.

Common from 5500–10,000 ft. alt., especially on bare gravelly sub-alpine slopes. Gardiner, 5600 ft. alt. ; Mt. Washburne, 9500 ft. alt.

Heracleum lanatum, Michx.

Bogs and along streams up to 8000 ft. alt. Common.

Ferula multifida, Gray.

Open woods. East Pelican Creek, 8400 ft. alt. Lewis Lake, 7800 ft. alt. Rather rare.

CORNACEÆ.

Cornus Canadensis, L.

East Pelican Creek, 8200 ft. alt. Rare.

Cornus stolonifera, Michx.

Near head of Pebble Creek, 8500 ft. alt. Rare.

CAPRIFOLIACEÆ.

Sambucus racemosa, L.

Open wooded slopes. Blacktail Deer Creek, 7600 ft. alt. ; Obsidian Cañon ; Upper Falls of the Yellowstone (Adams). Rather local.

Linnæa borealis, Gronov.

Common in mossy, damp woods up to 9000 ft. alt.

Symphoricarpos occidentalis, Hook.

About Mammoth Hot Springs. Yellowstone Lake (Adams).

Lonicera Utahensis, Wats.

Mammoth Hot Springs, 6500 ft. alt. Rare.

Lonicera cærulea, L.

Bogs. Head of Gibbon River, 8000 ft. alt. ; Yellowstone (Parry).

Lonicera involucrata, Banks.

Common on the borders of meadows and in open woods, especially from 8000–9000 ft. alt.

RUBIACEÆ.

Galium Aparine, L.

Gibbon Meadows, 7500 ft. alt. ; Mammoth Hot Springs, 6400 ft. alt. ; Yellowstone River, 6400 ft. alt. (Coulter). Not common.

Galium Aparine, L., var. *Vaillantii*, Koch (*G. Aparine*, L., var. *minor*, Hook).

Mouth of Soda Butte Creek, 6600 ft. alt.

Galium triflorum, Michx.

Common in damp places throughout. Mammoth Hot Springs, 6400 ft. alt. ; Mirror Lake, 8800 ft. alt.

Galium trifidum, L.

With the preceding, but rather less frequent.

Galium boreale, L.

Moist meadows and borders of woods. Very common from 7500–9000 ft. alt.

Galium bifolium, Wats.

Gravelly slides. Soda Butte Creek, near the eastern boundary of the Park, 8500 ft. alt.

VALERIANACEÆ.*Valeriana edulis*, Nutt.

A characteristic bog plant of the region, 6500–9000 ft. alt.

Valeriana sylvatica, Banks.

With the preceding, but often in dryer situations.

COMPOSITÆ.*Liatris punctata*, Hook.

Dry benches near Gardiner, 5400 ft. alt. ; common along the Yellowstone River beyond the limits of the Park.

Gutierrezia Euthamiæ, Torr and Gray.

With the preceding.

Chrysopsis villosa, Nutt.

A characteristic and common plant of the hot spring and geyser areas.

Chrysopsis villosa, Nutt., var. *hispida*, Gray.

Madison Lake (Coulter); Yellowstone (Parry).

Aplopappus uniflorus, Torr and Gray.

Rather common on hot spring and geyser formations ; not observed elsewhere.

Aplopappus Lyallii, Gray.

Common on nearly all the alpine slopes and summits from 9500–10,500 ft. alt.

Aplopappus acaulis, Gray.

Common over the northern portion. Sepulchre Mt., 9200 ft. alt.; Mt. Holmes, 9800 ft. alt.

Aplopappus suffruticosus, Gray.

Sepulchre Mt., 9000 ft. alt.; Yellowstone (Parry).

Aplopappus Macronema, Gray.

Gravelly open places. Elephant Back, 8500 ft. alt. (722 a less tomentose form). Sandy beaches along Yellowstone Lake near mouth of Pelican Creek (723).

Bigelovia graveolens, Gray.

Mammoth Hot Springs, 6000 ft. alt. (a glabrous form); Lower Geyser Basin (Coulter). Not common within the Park.

Bigelovia Douglasii, Gray.

A form approaching var. *serrulata*, Gray; with the preceding, but not common. A dwarf form (near var. *pumila*, Gray) is found over the open dry areas up to 8000 ft. alt.

Solidago multiradiata, Ait., var. *scopulorum*, Gray.

Meadows and slopes, 7500-9500 ft. alt. Common.

Solidago Missouriensis, Nutt.

Rather common up to 8000 ft. alt. Mammoth Hot Springs, 6200 ft. alt.; Yellowstone Lake, 7900 feet.

Solidago Missouriensis, Nutt., var. *montana*, Gray.

Border of woods. Mammoth Hot Springs, 6100 ft. alt.

Solidago Canadensis, L.

Found with *S. Missouriensis*, but rather more common.

Solidago nana, Nutt.

Mammoth Hot Springs, 6200 ft. alt. Not common.

Townsendia Parryi, Eaton.

Common in the northwestern portion of the Park. Grassy Slopes, Swan Lake, 7400 ft. alt. Subalpine, Mt. Holmes, 9400 ft. alt.

Townsendia Parryi, Eaton, var. *alpina*, Gray.

Alpine summits between East Fork of the Yellowstone and the Stinkingwater, 10,200 ft. alt.; "High divide between the Yellowstone and the Stinkingwater" (Parry).

Townsendia scapigera, Eaton.

Mt. Holmes, 10,000 ft. alt.

***Townsendia sericea*, Hook.**

Bare rocky summit of Saddle Mt., upper East Fork, 10,200 ft. alt. (697); "The northern form of Hooker, with pappus of ray flowers reduced" (Gray).

***Aster Sibiricus*, L.**

Open dry woods. Pelican Cone, 8700 ft. alt.; Mammoth Hot Springs, 6200 ft. alt.

***Aster conspicuus*, Lindl.**

With the preceding, but less frequent. Yellowstone (Parry, Forwood).

***Aster integrifolius*, Nutt.**

Meadows and border of woods, common from 6500-8500 ft. alt.

***Aster campestris*, Nutt.**

Mammoth Hot Springs, 6200 ft. alt.

***Aster commutatus*.**

Dry benches, Cache Creek, 7500 ft. alt.; Mammoth Hot Springs, 6200 ft. alt. Not common.

***Aster longifolius*, Lam.?**

Border of bogs, Gardiner River, 6200 ft. alt. Rare.

***Aster adscendens*, Lindl.**

Rather common, from 6000-8000 ft. alt.; Stevenson Island, Yellowstone Lake; Gibbon Meadows, 7500 ft. alt.; Hot Sulphur Springs (Adams).

***Aster Fremonti*, Gray.**

Mt. Washburne, 9000 ft. alt.

***Aster foliaceus*, Lindl.**

Meadows, and especially grassy slopes, from 8000-9000 ft. alt. Common. Turbid Lake, 7900 ft. alt.; Mt. Holmes, 9000 ft. alt.

***Aster foliaceus*, Lindl., var. *apricus*, Gray.**

Bell Peak, 9000 ft. alt.

***Aster scopulorum*, Gray.**

Dry rocky benches. Gardiner, 5600 ft. alt. Rare.

***Aster Engelmanni*, Gray.**

Rather common on grassy slopes, from 7500-8500 ft. alt. *Rays always white.*

Aster elegans, Torr and Gray.

With the preceding, but less frequent. Antelope Creek, 8000 ft. alt. ; Mirror Lake Plateau, 8800 ft. alt. ; Hot Sulphur Springs (Adams) ; Yellowstone (Parry).

Aster pulchellus, Eaton.

Common on wet subalpine slopes, from 9000-10,000 ft. alt.

Aster canescens, Pursh.

Sandy shore of Yellowstone Lake near Pelican Creek ; Alum Creek (Forwood) ; Yellowstone (Parry). Rather rare.

Erigeron uniflorus, L.

Alpine and subalpine. Common throughout. Frequently with white rays.

Erigeron lanatus, Hook.

With the preceding, but less common.

Erigeron salsuginosus, Gray.

Moist meadows and grassy slopes, 8000 ft. alt. to alpine. Mt. Washburne, 9500 ft. alt., an alpine form with white rays (123). Extremely common.

• *Erigeron salsuginosus*, Gray, var. *angustifolius*, Gray.

Mt. Norris, 9500 ft. alt. ; head of East Pelican Creek, 8600 ft. alt.

Erigeron macranthus, Nutt.

Grassy slopes and border of woods, from 6000-9000 ft. alt. Frequent. Gardiner River, 6000 ft. alt. ; Mt. Washburne, 8500 ft. alt. Shoshone Lake, 7600 ft. alt.

Erigeron glabellus, Nutt.

Mammoth Hot Springs, 6200 ft. alt. Rare.

Erigeron compositus, Pursh.

Slough Creek, 7200 ft. alt. ; Upper Falls of the Yellowstone (Adams). Rare.

Erigeron compositus, Pursh., var. *discoideus*, Gray.

Bare ridges and slopes, from 6000 ft. alt. to alpine. The common form.

Erigeron peucephyllus, Gray.

Dry volcanic soil, Junction Butte, 6300 ft. alt. Rare.

Erigeron ursinus, Eaton.

Yellowstone (Parry).

Erigeron radicans, Hook.

Alpine slopes, with *E. uniflorus*. Frequent.

Erigeron ochroleucus, Nutt.

Meadows along Slough Creek, 6600 ft. alt.

Erigeron cæspitosus, Nutt.

Grassy slopes. Specimen Ridge, 8000 ft. alt.; Mud Springs (Adams).
Not common.

Erigeron corymbosus, Nutt.

Mammoth Hot Springs, 6400 ft. alt.; Lower Geyser Basin (Coulter);
Mud Springs (Adams).

Erigeron acris, L.

Blacktail Deer Creek, 7400 ft. alt.; Mirror Lake Plateau, 8700 ft.
alt. Local.

Erigeron armeriæfolius, Turcz.

Bogs and wet meadows. Indian Creek, 8200 ft. alt.; Soda Butte
Creek, 7000 ft. alt.

Antennaria flagellaris, Gray.

Bare rocky ridges, Mt. Norris, 9200 ft. alt.

Antennaria Carpathica, R. Br., var. *pulcherrima*, Hook.

Common in bogs and wet meadows, from 7000-8500 ft. alt.

Antennaria alpina, Gaertn.

Rather common on alpine and subalpine summits.

Antennaria dioica, Gaertn.

Common on dry benches and ridges at low elevations.

Antennaria dioica, Gaertn., var. *rosea*.

Gardiner, 5300 ft. alt. Rare.

Anaphalis margaritacea, Benth. and Hook.

Mammoth Hot Springs, 6200 ft. alt.; Yellowstone Lake (Adams).
Not common.

Gnaphalium Sprengelii, Hook. and Arn.

A characteristic plant of the hot spring and geyser areas.

Iva xanthiifolia, Nutt.

Yellowstone (Forwood).

Iva axillaris, Pursh.

"Hot springs along the Yellowstone" (Forwood).

Rudbeckia occidentalis, Nutt.

Along streams and wet slopes on border of woods. Panther Creek, 8200 ft. alt. ; Obsidian Cañon, 7500 ft. alt. Rare.

Balsamorhiza sagittata, Nutt.

Open grassy slopes up to 8500 ft. alt. Common.

Wyethia helianthoides, Nutt.

Wet meadows, Indian Creek, 8200 ft. alt. Rare in the Park, but common on its northwest borders, along the Gallatin River.

Gymnolomia multiflora, Benth. and Hook.

Mammoth Hot Springs, 6800 ft. alt. ; Yellowstone Lake (Adams). Rare.

Helianthus Nuttallii, Torr and Gray.

In water or wet soil. Gardiner, 6300 ft. alt. ; Mammoth Hot Springs, 6200 ft. alt. ; Alum Creek (Forwood) ; Lower Geyser Basin (Coulter). Not common.

Helianthella quinquenervis, Gray.

Grassy slopes. Soda Butte Creek, near eastern boundary of the Park, 7800 ft. alt.

Helianthella Douglasii, Torr and Gray.

Very common on grassy slopes, from 6000–9000 ft. alt.

Madia glomerata, Hook.

Common in dry meadows up to 8500 ft. alt.

Eriophyllum cæspitosum, Dougl.

Rocky banks on the borders of timber. Rather common.

Chænactis Douglasii, Hook and Arn.

Mammoth Hot Springs, 6200 ft. alt. ; Sand beaches, Yellowstone Lake, 7740 ft. ; Fire-hole River (Coulter) ; Upper Geyser Basin (Forwood).

Gaillardia aristata, Pursh.

Open woods. Mammoth Hot Springs, 6200 ft. alt. Rare.

Achillea millefolium, L.

Common everywhere.

Artemisia dracunculoides, Pursh.

Dry banks and sandy lake shores. Indian Creek, 7500 ft. alt. ; Sand beaches, Yellowstone Lake, 7740 ft. alt. ; Yellowstone River (Coulter).

***Artemisia scopulorum*, Gray.**

Common on alpine slopes.

***Artemisia frigida*, Willd.**

Common about Blacktail Deer Creek and Mammoth Hot Springs, 6000-7500 ft. alt.; but rather less common elsewhere.

***Artemisia Ludoviciana*, Nutt.**

With *A. dracunculoides*.

***Artemisia discolor*, Dougl.**

Indian Creek, 7600 ft. alt.

***Artemisia discolor*, Dougl., var. *incompta*, Gray.**

Lower Geyser Basin (Coulter).

***Artemisia arbuscula*, Nutt.**

Mammoth Hot Springs, 6200 ft. alt.; Hayden Valley, 8000 ft. alt.

***Artemisia tridentata*, Nutt.**

Common on nearly all the dry open areas up to about 8500 ft. alt.

***Artemisia cana*, Pursh.**

With the preceding, and perhaps more abundant.

***Tetradymia canescens*, DC.**

Gardiner, 6300 ft. alt. Rare in the Park.

***Arnica cordifolia*, Hook.**

Common in open woods from 6000-9000 ft. alt.

***Arnica latifolia*, Bong.**

With the preceding, but less common.

***Arnica Chamissonis*, Less.**

Along streams in open woods. Pelican Cone, 8600 ft. alt.; Wet woods, Mirror Lake Plateau, 8800 ft. alt.; Yellowstone Falls and Yellowstone Lake (Adams). Rather local.

***Arnica longifolia*, Eaton.**

Dry washes along Cache Creek, 6800 ft. alt., and Pebble Creek, 8000 ft. alt.

***Arnica foliosa*, Nutt.**

Generally with *A. Chamissonis*. Meadows, Blacktail Deer Creek, 7400 ft.

***Arnica Parryi*, Gray.**

Pine woods, East Pelican Creek, 8200 ft. alt.; Yellowstone (Parry).
Rare.

***Arnica alpina*, Olin.**

Common on subalpine and alpine slopes. On rocky ridges and summits along East Fork, 8500-9000 ft. alt., occurs a 3-cephalous form.

***Senecio Fremonti*, Torr. and Gray.**

Slides along Soda Butte Creek, 8200 ft. alt. Rare.

***Senecio triangularis*, Hook.**

Common in bogs and wet meadows, from 7000-9000 ft. alt.; Red Mt., 10,000 ft. alt. (Coulter).

***Senecio serra*, Hook., var. *integriusculus*, Gray.**

Turbid Lake, 7900 ft. alt.; Shoshone Lake (Coulter).

***Senecio crassulus*, Gray.**

Bogs, Pebble Creek, 8000 ft. alt.; Indian Creek, 8000 ft. alt. Frequent.

***Senecio hydrophilus*, Nutt.**

Brackish marshes and muddy shores. Mammoth Hot Springs, 6200 ft. alt.; Outlet of Yellowstone Lake; Alum Creek (Forwood).

***Senecio integerrimus*, Nutt.**

Bogs, Pebble Creek, 8200 ft. alt. (a form with solitary heads). Rare.

***Senecio lugens*, Richards.**

Very common in bogs from 7500-9000 ft. alt.

***Senecio canus*, Hook.**

Common in dry open places up to 8000 ft. alt.

***Senecio aureus*, L., var. *subnudus*, Gray.**

Rather common in grassy bogs. Lakes, head of Gibbon River, 8000 ft. alt.; Mirror Lake Plateau, 8800 ft. alt.; Lower Geyser Basin (Coulter).

***Senecio aureus*, L., var. *croceus*, Gray.**

Yellowstone Lake (Coulter).

***Cnicus Hookerianus*, Gray.**

Dry marshes along Soda Butte Creek, 7500 ft. alt.; Rocky, subalpine ridges of Mt. Morris, 9000 ft. alt. Rare.

***Cnicus Drummondii*, Gray.**

Very common in open places up to 8500 ft. alt., from a few inches to several feet in length.

Stephanomeria minor, Nutt.

Alum Creek (Forwood).

Stephanomeria exigua, Nutt.

Mud Springs (Adams).

Microseris nutans, Gray.

Grassy meadows, Mammoth Hot Springs, 6200 ft. alt.

Hieracium gracile, Hook.

Pine woods from 7500-9000 ft. alt. Frequent.

Hieracium albiflorum, Hook.

With the preceding.

Hieracium cynoglossoides, Arvet.

Rich grassy slopes. Bell's Peak, 8500 ft. alt.; Mt. Washburne, 8000 ft. alt. Frequent.

Crepis runcinata, Torr. and Gray.

Wet meadows. Indian Creek, 8000 ft. alt.; Yellowstone Lake (Adams).

Crepis acuminata, Nutt.

Dry banks. Mammoth Hot Springs, 6400 ft. alt.; Grassy slopes, Swan Lake, 7500 ft. alt.

Crepis occidentalis, Nutt.

Mammoth Hot Springs, 6200 ft. alt.; Firehole River (Coulter); Upper Falls of the Yellowstone (Adams). Rather common.

Lygodesmia juncea, Don.

Gardiner, 5300 ft. alt.; Mud Springs (Adams). Rare.

Lygodesmia spinosa, Nutt.

Dry benches, Gardiner. Rare.

Hulsea nana, Gray.

Slides, Mt. Holmes, 10,000 ft. alt. Frequent in the Gallatin Range.

Troximon glaucum, Nutt.

Meadows and slopes, common throughout.

Troximon aurantiacum, Hook.

Meadows and open woods up to 9000 ft. alt. Common.

Taraxacum officinale, Weber, var. *lividum*, Koch.

Bogs, Blacktail Deer Creek, 7400 ft. alt.; Pebble Creek, 8000 ft. alt. Not common.

Taraxacum officinale, Weber, var. *scopulorum*, Gray.

Slides, Soda Butte Creek, 8600 ft. alt. Rare.

Lactuca pulchella, DC.

Mammoth Hot Springs, 6200 ft. alt.; Yellowstone Lake, 7800 ft. alt.;
Alum Creek (Forward). Frequent.

LOBELIACEÆ.

Laurentia carnosula, Benth.

Muddy shore of Yellowstone Lake (Adams).

CAMPANULACEÆ.

Campanula rotundifolia, L.

Grassy places. Very common from 6000–9000 ft. alt.

ERICACEÆ.

Vaccinium myrtilloides, Hook.

Damp woods. Pelican Creek, 8400 ft. alt. Rare.

Vaccinium occidentale, Gray.

Wooded bogs head of the Gibbon River, 8000 ft. alt. (2–3 feet in height). Rare.

Vaccinium cæspitosum, Michx.

Shoshone Lake (Coulter).

Vaccinium Myrtilus, L., var. *microphyllum*, Hook.

Dense and sparsely wooded slopes and plateaus, from 7500–9000 ft. alt. Extremely common. Frequently the only vegetation in dense pine woods. Berries *always* light red.

Arctostaphylos Uva-ursi, Spreng.

Common in dry rocky places, especially over hot spring and geyser areas.

Gaultheria Myrsinites, Hook.

Mossy, damp woods. Gibbon Lakes, 8000 ft. alt.; Broad Creek, 8500 ft. alt.

Bryanthus empetrifomis, Gray.

Subalpine wet slopes on the borders of timber. Rather common.

Kalmia glauca, Ait.

Bogs. Sour Creek, 8600 ft. alt., 2–6 inches high (var. *microphylla*, Hook). “Shoshone Lake on geyserite” (Coulter). Not common.

Ledum grandulosum, Nutt.

Generally in dense damp fir woods from 8000-9500 ft. alt.

Chimaphila umbellata, Nutt.

Soda Butte Creek, 8500 ft. alt. ; Yellowstone Lake (Adams). Rare.

Moneses uniflora, Gray.

Deep moist woods. Soda Butte Creek, 8500 ft. alt. ; East Pelican Creek, 8600 ft. alt. ; Yellowstone Lake and Yellowstone Falls (Adams). Not common.

Pyrola secunda, L.

Cache Creek, 7600 ft. alt. ; Mirror Lake, 8800 ft. alt. ; Firehole River (Coulter); Yellowstone Lake (Adams). Frequent.

Pyrola chlorantha, Swartz.

Woods. Cache Creek, 8500 ft. alt. ; Yellowstone Lake (Adams). Rare.

Pyrola rotundifolia, L., var. *uliginosa*, Gray.

Fir woods. Soda Butte Creek, 8000 ft. alt. ; Upper Falls of the Yellowstone (Adams).

Pyrola picta, Smith.

Dry timbered slopes. Sulphur Hills, Pelican Creek, 9000 ft. alt. Rare.

Pterospora andromedea, Nutt.

Under *Pinus Murrayana*. Yellowstone Lake ; along the Yellowstone (Coulter); Upper Falls of the Yellowstone (Adams). Rather rare.

Monotropa Hypopitys, L.

Rather common in pine woods.

PRIMULACEÆ.

Dodecatheon Meadia, L.

Bogs and wet slopes, from 6000-9000 ft. alt.

Douglasia montana, Gray.

Alpine summit of Mt. Holmes, 1000 ft. alt.

Androsace septentrionalis, L.

In wet open places, from 6000 ft. alt. to alpine. Rather common. Swan Lake, 7400 ft. alt. ; Mt. Washburne, 9800 ft. alt. ; Yellowstone Lake (Adams).

Androsace filiformis, Retz.

With the preceding at low elevations.

Centunculus minimus, L.

Border of bogs. Mammoth Hot Springs, 6200 ft. alt.

GENTIANACEÆ.

Gentiana serrata, Gunner.

Wet places, 6000–8500 ft. alt. Common almost everywhere.

Gentiana Amarella, L., var. *acuta*, Hook.

Bogs. Indian Creek, 8000 ft. alt.; Blacktail Deer Creek, 7500 ft. alt.;

Cache Creek, 7600 ft. alt.; Heart Lake (Coulter). Frequent.

Gentiana Forwoodii, Gray.

Rather dry meadows, 6000–8000 ft. alt.; Yellowstone Lake at outlet, 7800 ft. alt.; East Fork, 7500 ft. alt. In lower and dryer situations than *G. serrata*, and much less common.

Swertia perennis, L.

Yellowstone Falls (Parry); Yellowstone (Forwood).

Frasera speciosa, Dougl.

Common in meadows and on grassy slopes, from 6000–8000 ft. alt.

POLEMONIACEÆ.

Phlox canescens, Torr. and Gray.

Grassy slopes about Swan Lake and Indian Creek, 7300–8000 ft. alt. June 15, with *P. Douglasii*, Hook, var. *longifolia*, Gray, but flowering about two weeks earlier.

Phlox Douglasii, Hook.

Very common on subalpine and alpine slopes throughout.

Phlox Douglasii, Hook, var. *longifolia*, Gray.

Dry slopes at lower elevations than the type. Very common.

Phlox longifolia, Nutt.

Mammoth Hot Springs, 6400 ft. alt.

Phlox longifolia, Nutt., var. *brevifolia*, Gray.

Rocks, Yellowstone Lake (Adams).

Gilia linearis, Gray.

Common throughout at low elevations.

Gilia gracilis, Hook.

With the preceding, but less common.

Gilia liniflora, Benth., var. *pharnaceoides*, Gray.

Dry open places at low elevations. Rather common.

Gilia nudicaulis, Gray.

Moist meadows. Swan Lake, 7400 ft. alt. Rare.

Gilia pungens, Benth.

Rocky ridges, Tower Falls, 6400 ft. alt.; Slides, Mt. Evarts, 7000 ft. alt. Rare.

Gilia tenerrima, Gray.

Dry banks. Soda Butte, 6800 ft. alt. Rare.

Polemonium confertum, Gray.

Alpine and subalpine rocky slopes. Common.

Polemonium humile, Willd., var. *pulchellum*, Gray.

Dry slopes from 5500-8000 ft. alt. Frequent.

Polemonium cæruleum, L.

Bogs and wet meadows. Indian Creek, 7500 ft. alt.; Alum Creek (Forwood); Lower Geyser Basin (Coulter); Yellowstone Lake (Adams).

Polemonium foliosissimum, Gray.

Stevenson Island, Yellowstone Lake (Adams); Yellowstone Lake (Coulter).

HYDROPHYLLACEÆ.

Nemophila breviflora, Gray.

Dry slopes. Soda Butte, 6700 ft. alt.

Ellisia Nyctelea, L.

Mammoth Hot Springs.

Phacelia circinata, Jacq. F.

Dry open places up to 8000 ft. alt.

Phacelia Franklinii, Gray.

Sepulchre Mt., 7500 ft. alt.; Tower Falls, 6400 ft. alt.; Yellowstone Lake. Frequent.

Phacelia sericea, Gray.

Mammoth Hot Springs, 7000 ft. alt.; Geode Creek, 7500 ft. alt.; Red Mt., 9600 ft. alt. (Coulter).

Phacelia Menziesii, Torr.

Mud Springs (Adams).

BORRAGINACEÆ.

Echinospermum floribundum, Lehm.

Common about Mammoth Hot Springs.

Echinospermum Redowskii, Lehm., var. *occidentale*, Wats.

Mammoth Hot Springs, 6400 ft. alt.; Yellowstone Lake (Adams).
Rare.

Omphalodes nana, Gray, var. *aretioides*, Gray (*Eritrichium nanum*, Schrad.,
var. *aretioides*, Herder.)

On most of the high alpine summits throughout.

Krynitzkia Californica, Gray.

Muddy shore of ponds at outlet of Yellowstone Lake.

Krynitzkia ambigua, Gray (*Eritrichium muriculatum*, var. *ambiguum*, Gray).

Common on open dry slopes at low elevations.

Krynitzkia Torreyana, Gray (*Eritrichium leiocarpum*, Wats., Bot. King Ex.,
in part).

With the preceding.

Krynitzkia crassisepala, Gray.

Mammoth Hot Springs.

Krynitzkia sericea, Gray (*Eritrichium glomeratum*, var. *humile*, Gray).

Dry benches, Gardiner, 5300 ft. alt.

Mertensia Sibirica, Don.

Wet meadows, slopes and along mountain streams. Very common,
from 8000-9000 ft. alt. Flowering in *August*.

Mertensia lanceolata, DC.

At lower elevations and less common. Flowering in *June*.

Mertensia alpina, Don.

Wet subalpine and alpine slopes. Common.

Myosotis sylvatica, Hoffm., var. *alpestris*, Koch.

Common throughout, from 6000-10,000 ft. alt.

SCROPHULARIACEÆ.

Collinsia parviflora, Dougl.

Common throughout at low altitudes.

Penstemon Menziesii, Hook.

Rocky ridges and slides. Mt. Holmes, 9500 ft. alt.; Mt. Norris, 9700 ft. alt.; Yellowstone Lake (Adams). Not common. Corolla pink-purple.

Penstemon Menziesii, Dougl., var. **Douglasii**, Gray.

Rocks along Slough Creek, 6500 ft. alt. Leaves from lanceolate to linear lanceolate, 1-2½ inches long, sparsely serrulate. Corolla violet-purple. Rare.

Penstemon glaber, Pursh.

Rather common on open dry slopes up to 7500 ft. alt.

Penstemon glaber, Pursh., var. **cyananthus**, Gray.

Mammoth Hot Springs, 6500 ft. alt.

Penstemon deustus, Dougl.

Dry rocky soil, Junction Butte, 6200 ft. alt. Rare.

Penstemon confertus, Dougl., var. **cæruleo-purpureus**, Gray.

Common throughout up to 8500 ft. alt.; Upper East Fork, 10,300 ft. alt. (alpine forms from 2-4 inches high).

Penstemon gracilis, Nutt.

Rocky places about Mammoth Hot Springs and Swan Lake, 5300-7500 ft. alt.

Mimulus nanus, Hook & Arn.

Rather rare about the hot springs and geysers. Upper Geyser Basin, 7300 ft. alt.; Hot Springs (Parry); Crater Hills (Coulter).

Mimulus rubellus, Gray.

Swan Lake, 7400 ft. alt.; Slough Creek, 6500 ft. alt. Flowers yellow or rose color.

Mimulus montioides, Gray in Suppl. Flor. N. A., 450.

With the preceding, but less common.

Mimulus moschatus, Dougl.

Mossy bogs and about springs. East Pelican Creek, 8200 ft. alt.; Cache Creek, 7700 ft. alt.

Mimulus Lewisii, Pursh.

Bogs, mountain streams and wet subalpine slopes. Common above 8000 ft. alt.

Mimulus luteus, L.

Bogs and streams. Common up to 8000 ft. alt.

Limosella aquatica, L.

Muddy shore of ponds. Turbid lake, 7900 ft. alt.; Ponds at outlet of Yellowstone Lake.

Synthyris rubra, Benth.

Open slopes from 6500-9000 ft. alt. Common.

Veronica Anagallis, L.

Heart Lake (Coulter).

Veronica Americana, Schwein.

Bogs and wet places, rather common up to 8000 ft. alt.; Indian Creek, 8000 ft. alt.; Mammoth Hot Springs, 6000 ft. alt.

Veronica scutellata, L.

With the preceding. East Fork, 7000 ft. alt.; Yellowstone Lake (Adams).

Veronica alpina, L.

Wet meadows and slopes from 7500 ft. alt. to alpine. Common.

Veronica serpyllifolia, L.

Wet meadows and muddy shores of ponds up to 8500 ft. alt. Frequent.

Veronica peregrina, L.

With the preceding, but less common. Yellowstone Lake at outlet.

Castilleia minor, Gray.

Mammoth Hot Springs, 6200 ft. alt.; Upper Geyser Basin, 7300 ft. alt.; Mud Springs (Adams). Local.

Castilleia parviflora, Bong.

Bogs and meadows up to 8000 ft. alt. Frequent. Replaced at higher elevations by *C. miniata*.

Castilleia miniata, Dougl.

Bogs, wet meadows and slopes from 7000 to 9500 ft. alt.; Extremely common above 8500 ft. alt. over subalpine meadows and slopes. Flowers all shades of red, scarlet, crimson, cream color and white.

Castilleia pallida, Kunth., var. *septentrionalis*, Gray.

Rather common on subalpine slopes.

Castilleia pallida, Kunth., var. *occidentalis*, Gray.

High alpine summits. North Fork of the Stinkingwater, 10,300 ft. alt.

Orthocarpus pallescens, Gray.

Rather dry meadows, 6000–8000 ft. alt. Common.

Orthocarpus luteus, Nutt.

Mammoth Hot Springs, 6200 ft. alt.; Hot Springs, Yellowstone Lake; Yellowstone Lake (Adams).

Orthocarpus pilosus, Wats.

Wet meadows. Blacktail Deer Creek, 7400 ft. alt.; Slough Creek, 6600 ft. alt.

Pedicularis Grœnlandica, Retz.

Common throughout in bogs from 7000–9000 ft. alt.

Pedicularis racemosa, Dougl.

Open pine woods. East Pelican Creek, 8600 ft. alt.; Saddle Mt., 8600 ft. alt.; Indian Creek, 8000 ft. alt.; Yellowstone and Shoshone Lakes (Coulter).

Pedicularis Parryi, Gray.

“Pine woods at foot of Yellowstone Lake” (Parry).

Pedicularis bracteosa, Benth.

Border of woods generally with *P. racemosa*.

Pedicularis scopulorum, Gray.

Swan Lake, 7400 ft. alt. Frequent on subalpine and alpine slopes.

OROBANCHACEÆ.

Aphyllon fasciculatum, Gray.

Soda Butte, 6800 ft. alt.; Hayden's Valley, 8000 ft. alt. On *Artemisia*.

Aphyllon Ludovicianum, Gray.

Sulphur Hills, Pelican Creek. Yellowstone Lake (Adams).

LENTIBULARIACEÆ.

Utricularia vulgaris, L.

Common in lake sloughs and sluggish streams. Lewis Lake, Heart Lake, Broad Creek, 8200 ft. alt.; Head of Yellowstone Lake (Parry).

LABIATÆ.

Mentha Canadensis, L.

Common throughout in wet places at low elevations.

Mentha Canadensis, L., var. *glabrata*, Benth.

With the typical form.

Lycopus Virginicus, L., var. *pauciflorus*, Benth. (*L. humilis*, Vahl.).

About hot springs. Yellowstone Lake, Upper and Lower Geyser basins. Norris Geyser Basin. The filiform runners covered with small tubers.

Brunella vulgaris, L.

About hot springs with the preceding.

Dracocephalum parviflorum, Nutt.

Mammoth Hot Springs, 6300 ft. alt.; Hot Sulphur Springs (Adams).
Not common.

PLANTAGINACEÆ.

Plantago Tweedyi, Gray in Suppl. Flor. N. A. 390.

Grassy rich meadows north end of Mirror Lake Plateau, 8500-9000 ft. alt.

NYCTAGINACEÆ.

Abronia villosa, Wats.

Sandy beaches of Yellowstone Lake at mouth of Pelican Creek.

CHENOPODIACEÆ.

Chenopodium olidum, Wats.

Turbid Lake, 7900 ft. alt.; Stevenson Island, Yellowstone Lake.

Chenopodium glaucum, L.

On hot spring formation. Yellowstone Lake and Upper Geyser Basin.

Chenopodium Fremontii, Wats.

Rather common in dry situations up to 8000 ft. alt.

Chenopodium leptophyllum, Nutt.

With the preceding.

Chenopodium capitatum, Wats.

Mammoth Hot Springs, 6400 ft. alt.; Turbid Lake, 7900 ft. alt. Yellowstone Lake (Adams).

Monolepis chenopodioides, Moq.

Turbid Lake, 7900 ft. alt.; Yellowstone Lake. In muddy places.

Eurotia lanata, Moq.

Dry benches. Gardner, 5300 ft. alt.

Salicornia herbacea, L.

Lower Geyser Basin (Coulter).

POLYGONACEÆ.

Eriogonum umbellatum, Torr.

Grassy slopes and dry banks. Very common throughout up to 8000 ft. alt.

Eriogonum heracleoides, Nutt.

With the preceding, but less common.

Eriogonum flavum, Nutt.

Common over the hot spring areas throughout.

Eriogonum cæspitosum, Nutt.

Rocky, bare slopes. Sepulchre Mountain, 8500 ft. alt.

Eriogonum ovalifolium, Nutt.

Common throughout, from dry rocky ridges and benches at low elevations, 5400 ft. alt., to subalpine and alpine.

Oxyria digyna, Campdera.

Rocky, wet places, subalpine and alpine. Swan Lake, 7400 ft. alt.

Rumex venosus, Pursh.

Sandy bluffs at outlet and Stevenson Island, Yellowstone Lake.

Rumex salicifolius, Weinman.

Sandy shores and wet meadows. Rather common.

Rumex maritimus, L.

Frequent in alkaline marshes.

Rumex paucifolius, Nutt.

Common in high meadows and bogs, 8000-9500 ft. alt.

Polygonum aviculare, L.

Sand beaches, Yellowstone Lake at mouth of Pelican Creek.

Polygonum Douglasii, Greene (*P. tenue*, Michx.).

Common in dry places up to 8500 ft. alt.

Polygonum Douglasii, var. *latifolium*, Greene (*P. tenue*, Michx., var. *latifolium*, Engelm.).

Rocky subalpine ridges, Bison Peak, 9000 ft. alt.; Mt. Norris, 8600 ft. alt.

Polygonum imbricatum, Nutt.

Moist places. Blacktail Deer Creek, 7400 ft. alt.; Slough Creek, 6600 ft. alt.; East Pelican Creek, 8400 ft. alt. Frequent.

Polygonum polygaloides, Meisner.

Blacktail Deer Creek, 7200 ft. alt.

Polygonum amphibium, L.

Common in ponds about Yellowstone Lake. Broad Creek, 8300 ft. alt.

Polygonum Muhlenbergii, Wats.

Red Mountain (Coulter).

Polygonum Bistorta, L.

Bogs and meadows, 7500-9500 ft. alt. Extremely common in subalpine meadows. The common form is var. *linearifolium*, Wats.

Polygonum viviparum, L.

With the preceding, but much less common. Indian Creek, 8000 ft. alt.; Cache Creek, 7400 ft. alt.; Firehole River (Coulter); Yellowstone Falls (Adams).

ELÆAGNACEÆ.

Elæagnus argentea, Pursh.

Mammoth Hot Springs. Rare.

Shepherdia Canadensis, Nutt.

Bell Peak, 8400 ft. alt.; Cache Creek, 7600 ft. alt. Yellowstone Lake (Adams).

LORANTHACEÆ.

Arceuthobium Americanum, Nutt.

Common on *Pinus Murrayana*.

SANTALACEÆ.

Comandra pallida, A. DC.

Dry banks, common up to 8000 ft. alt.

EUPHORBIACEÆ.

Euphorbia serpyllifolia, Pers.

Common on the formation of the Geyser Basins.

Euphorbia glyptosperma, Engelm.

Yellowstone Lake (Adams).

Euphorbia dictyosperma, Fisch. & Meyer.

Yellowstone (Forwood).

CALLITRICHACEÆ.*Callitriche verna*, L.

Upper Falls of the Yellowstone (Adams).

Callitriche autumnalis, L.

Submersed in ponds and sluggish streams up to 8000 ft. alt. Common.

CERATOPHYLLACEÆ.*Ceratophyllum demersum*, L.

Frequent in sluggish streams and lake sloughs throughout up to 8500 ft. alt.

URTICACEÆ.*Urtica gracilis*, Ait.

Borders of woods. Slough Creek, 6600 ft. alt.; East Pelican Creek, 8500 ft. alt. Rare.

CUPULIFERÆ.*Betula occidentalis*, Hook.

Gardiner, 5300 ft. alt.; Cache Creek, 7000 ft. alt. Along streams. Rare.

Betula glandulosa, Michx.

Bogs from 7500-9000 ft. alt. Common.

Alnus viridis, DC.

Yellowstone Lake (Adams).

Alnus incana, Willd., var. *virescens*.

Wooded slopes, Pebble Creek, 8500 ft. alt. Rare.

SALICINEÆ.*Salix longifolia*, Muhl.

Mammoth Hot Springs, 6400 ft. alt. A form with generally smooth capsules and scales. Not common.

Salix cordata, Muhl., var. *Mackenziana*, Hook.

Rescue Creek, Mt. Evarts, 7500 ft. alt. Rare.

Salix glauca, L. (a form).

Bogs and along streams, from 6500-8500 ft. alt. Frequent.

Salix glaucops, Anders.

Subalpine, Mt. Washburne, 9000 ft. alt.

Salix desertorum, Richards, var. *Wolfii*, Bebb.

Bogs and streams, common throughout, up to 8500 ft. alt.

Salix arctica, R. Br., var. *petræa*, Anders.

Alpine slopes and summits. Frequent.

Salix reticulata, L.

With the preceding, but more common.

Populus tremuloides, Michx.

Along streams and in small groves over moist slopes, up to 8000 ft. alt.

Populus angustifolia, James.

Cache Creek, 7000 ft. alt. Rare.

ORCHIDACEÆ.

Corallorhiza multiflora, Nutt.

Shoshone Lake (Coulter).

Corallorhiza innata, R. Br.

Moist woods, rather common. Swan Lake, 7400 ft. alt.; Gibbon Meadows, 7400 ft. alt.; Lewis Lake, 7600 ft. alt.

Habenaria Unalaschensis, Wats.

Mammoth Hot Springs, 6500 ft. alt.; Cache Creek, 7200 ft. alt. In moist woods, rare.

Habenaria hyperborea, R. Br.

Open and wooded bogs, from 7500–8500 ft. alt. Common.

Habenaria dilatata, Gray.

With the preceding.

Habenaria obtusata, Richardson.

Mossy woods, Soda Butte Creek, 7200 ft. alt., with *Listera*.

Spiranthes Romanzoffiana, Cham.

Bogs and moist meadows throughout, up to 8500 ft. alt.

Listera convallarioides, Nutt.

Mossy pine woods, Soda Butte Creek, 7200 ft. alt. Rare.

Listera cordata, R. Br.

With the preceding and more common. Gibbon Meadows, 7400 ft. alt.

IRIDACEÆ.

Iris Missouriensis, Nutt.

Rescue Creek, Mt. Evarts, 7000 ft. alt. Rare.

Sisyrinchium mucronatum, Michx.

Mammoth Hot Springs, 6200 ft. alt.; Pelican Creek, 8200 ft. alt.; Upper Yellowstone Falls (Adams).

LILIACEÆ.

Allium Schönoprasum, L.

Bogs, from 6500 (Slough Creek) to 8500 ft. alt. Frequent.

Allium brevistylum, Wats.

With the preceding, but ranging higher, and generally common throughout. Often in open moist woods.

Allium cernuum, Roth.

Dry open places, up to 8000 ft. alt. Common.

Allium stellatum, Fraser.

Mud Springs (Adams).

Allium Geyeri, Wats.

Rocky wet benches, East Fork, 6400 ft. alt.

Allium Tolmiei, Baker.

Rocky bare subalpine ridges. Bison Peak, 8500 ft. alt.; Mt. Washburne, 9000 ft. alt.

Smilacina stellata, Desf.

Moist coves, up to 8000 ft. alt. Frequent.

Fritillaria atropurpurea, Nutt.

Wooded slopes, Mammoth Hot Springs, 6400 ft. alt.; Grassy ridges Sepulchre Mountain, 8000 ft. alt. Yellowstone Lake (Adams). Rather rare.

Fritillaria pudica, Spreng.

Sepulchre Mountain, 8500 ft. alt.; Mt. Washburne, 9000 ft. alt.

Erythronium grandiflorum, Pursh.

Swan Lake, 7500 ft. alt.

Lloydia serotina, Reichenb.

Volcanic slides, East Fork, 8000 ft. alt.

Calochortus Nuttallii, Torr. and Gray.

Yellowstone Lake (Adams).

Calochortus eurycarpus, Wats.

Yellowstone (Parry). Yellowstone Lake (Adams).

Streptopus amplexifolius, DC.

Woods, Pelican Creek, 8000 ft. alt.; Upper Falls of the Yellowstone (Adams).

Prosartes trachycarpa, Wats.

Timbered slopes. Mammoth Hot Springs, 6500 ft. alt.

Zygadenus elegans, Pursh.

Bogs, 6000-8500 ft. alt. Common.

Zygadenus venenosus, Wats.

Mammoth Hot Springs. Rare.

JUNCACEÆ.

Luzula spadicea, DC., var. *parviflora*, Meyer.

Bogs and wet meadows, 7000-9000 ft. alt. Common.

Luzula comosa, Meyer.

Indian Creek, 8000 ft. alt. ; Cache Creek, 7500 ft. alt.

Luzula campestris, DC.

Grassy slopes, 7500-9500 ft. alt. Common.

Luzula spicata, Desv.

On high alpine summits. Common throughout.

Juncus Balticus, Deth., var. *montanus*, Engelm.

Bogs and along streams up to 8000 ft. alt. Common.

Juncus Drummondii, E. Meyer.

With the preceding

Juncus Parryi, Engelm.

Upper Falls of the Yellowstone (Adams).

Juncus tenuis, Willd., var. *congestus*, Engelm.

Muddy shore of Turbid Lake, 7000 ft. alt. ; Lower Geyser Basin (Coulter); Mud Springs (Adams).

Juncus bufonius, L.

Turbid Lake and the Geyser Basins.

Juncus longistylis, Torr. and Gray.

Wet places. Common from 7000 9000 ft. alt.

Juncus Canadensis, J. Gay, var. *coarctatus*, Engelm.

Mammoth Hot Springs, 6400 ft. alt. Mud Springs (Adams).

Juncus Mertensianus, Meyer.

East Fork, 7500 ft. alt.; Slough Creek, 6500 ft. alt.; Yellowstone Lake and Upper Falls of the Yellowstone (Adams).

Juncus Nevadensis, Wats.

Mammoth Hot Springs, 6400 ft. alt.

Juncus xiphioides, Meyer, var. *montanus*, Engelm.

Common throughout up to 8000 ft. alt.

TYPHACEÆ.

Typha latifolia, L.

Head of Yellowstone Lake (Parry).

Sparganium simplex, Hudson, var. *angustifolium*, Engelm.

Ponds and streams throughout up to 8000 ft. alt.

LEMNACEÆ.

Lemna trisulca, L.

Ponds and streams throughout, up to 8000 ft. alt. Very common in the Geyser Basins.

Lemna minor, L.

With the preceding.

Lemna gibba, L.

Ponds, head of Broad Creek, 8500 ft. alt.

ALISMACEÆ.

Sagittaria variabilis, Engelm.

Gibbon Lakes, 8000 ft. alt.; Yellowstone Lake; Lewis Lake. Rather common, but rarely flowering.

NAIADACEÆ.

Zanichellia palustris, L.

Yellowstone Lake (Parry—Adams).

Ruppia maritima, L.

Common in the sluggish streams and waterholes of the hot springs and geyser areas.

Potamogeton rufescens, Schrad.

Hot Sulphur Springs (Adams).

Potamogeton gramineus, L., var. *maximus*, L.

Ponds and streams throughout, up to 8000 ft. alt.

Potamogeton perfoliatus, L.

With the preceding.

Potamogeton pectinatus, L.

Common, especially in the streams of the hot springs and geyser areas.

Potamogeton pectinatus, L., var. *latifolius*, Robbins.

With the preceding.

Triglochin maritimum, L.

Common in the bogs of the hot springs and geyser areas.

CYPERACEÆ.

Eriophorum russeolum, Fries.

Bogs about head of Sour Creek, 8500 ft. alt. "The nearest other known localities are Hudson's Bay and Sitka, Alaska" (Watson).

Eriophorum polystachyum, L.

Rather rare in bogs, from 7500-8500 ft. alt.

Eleocharis acicularis, R. Br.

Turbid Lake, 7900 ft. alt.

Eleocharis palustris, R. Br.

Rather common in wet places over the hot spring and geyser areas.

Eleocharis olivacea, Torr.

With the preceding, but rather rare. Hot streams, East Fork of the Firehole River, 8000 ft. alt.; Mud Springs (Adams).

Carex scirpoidea, Michx.

High alpine summits, North Fork of Stinkingwater, 10,700 ft. alt.

Carex Geyeri, Boott.

Slough Creek, 6500 ft. alt.; Mirror Lake Plateau, 8500 ft. alt.

Carex concinna, R. Br.

Pine woods, Slough Creek, 6500 ft. alt.

Carex aurea, Nutt.

Gardiner, 5300 ft. alt.; Firehole River (Coulter).

Carex longirostris, Torr.

Grassy thickets, Mammoth Hot Springs, 6000 ft. alt. Rare.

Carex utriculata, Boott, var. *minor*, Sartwell.

Common from 7000-8000 ft. alt. Generally in water.

Carex utriculata, Boott, var. *globosa*, Olney.

With the preceding.

Carex aquatilis, Wahl.

Yellowstone (Parry); Upper Falls of the Yellowstone (Adams).

Carex vulgaris, Fries.

Indian Creek, 8000 ft. alt.; Mt. Washburne, 8500 ft. alt.; Yellowstone (Parry).

Carex rigida, Good.

Bogs and mountain slopes from 8000-9500 ft. alt. Frequent.

Carex acuta, L.

Blacktail Deer Creek, alt. 7400 ft.; Yellowstone Lake, alt. 7800 ft.

Carex Reynoldsii, Dew.

Common in mountain bogs from 7500-9000 ft. alt.

Carex atrata, L.

With the preceding.

Carex alpina, Swartz.

Wooded bogs. Soda Butte Creek, alt. 7500 ft. Rare.

Carex muricata, L.

Common in bogs and meadows from 7000-8500 ft. alt.

Carex siccata, Dew.

Mud Springs (Adams).

Carex vitilis, Fries.

Mammoth Hot Springs, 6300 ft. alt.; Obsidian Cañon, 7500 ft. alt. Yellowstone (Parry).

Carex Bonplandii, Kunth.?

Yellowstone (Parry). Coulter's Manual, p. 395.

Carex festiva, Dew.

Common in meadows from 7000-9000 ft. alt.

Carex leporina, L.

Red Mountain (Coulter).

Carex Liddoni, Boott.

Meadows. Mirror Lake Plateau, 8500-9000 ft. alt.

Carex globosa, Boott.

With the preceding, but less frequent.

GRAMINEÆ.

NOTE —The numbers appended to the species below are those under which the author's specimens have been distributed. Mr. F. L. Scribner will shortly publish in the "Botanical Gazette" critical notes on the author's collections of 1884 and 1885.

Panicum dichotomum, L., var. *pubescens* (*P. thermale*, Bol.).

Very common over the hot spring and geyser areas (263, 580).

Spartina gracilis, Trin.

"In both Geyser Basins" (Coulter).

Phalaris arundinacea, L.

Bogs. Yellowstone Lake (579); Upper Cañon of the Madison (Coulter).
Rare.

Hierochloa borealis, R. and S.

Rather common in mountain meadows from 8000–9000 ft. alt. (648).

Alopecurus occidentalis, Scribn. (*A. pratensis*, var. *alpestris*, Wahl. ex Gray).

Frequent in mountain meadows from 7500–9000 ft. alt. Associated with the preceding and *Phleum alpinum* (591).

Alopecurus geniculatus, L., var. *aristulatus*, Torr. (*A. aristulatus*, Michx.).

Muddy shores of ponds and banks of streams. Cache Creek, 6800 ft. alt.; Turbid Lake, 7900 ft. alt. (592).

Aristida fasciculata, Torr. (*A. purpurea*, Nutt.).

Hot Sulphur Springs and Yellowstone Lake (Adams).

Stipa viridula, Trin.

Common everywhere over the dry open areas up to 8000 ft. alt. (262, 609, 613).

Stipa Richardsonii, Link.

Soda Butte Creek, 6800 ft. alt. With the preceding, but much less common (611).

Stipa comata, Trin. and Rupr., var. *intermedia*, Scribn.

Throughout with *S. viridula*; rather less frequent (610).

Oryzopsis asperifolia, Michx.

Pine woods, Soda Butte Creek, alt. 7500. Rare (615).

Oryzopsis exigua, Thurb.

On rocky bare knolls along Slough Creek, alt. 6700 ft. Rare (614).

Oryzopsis cuspidata, Benth.

Sparingly over the lower and dryer open areas.

Muhlenbergia comata, Benth.

Upper Geyser Basin (Coulter).

Phleum alpinum, L.

Bogs and meadows, very common from 8000-9000 ft. alt. (649).

Sporobolus depauperatus, Scribn. (*Vilfa depauperata*, Torr.).

Yellowstone Lake (590); Upper Geyser Basin (Coulter).

Sporobolus asperifolius, Thurb.

Frequent in arid situations at low altitudes.

Agrostis varians, Trin.

Common in moist places, up to 9000 ft. alt. (605).

Agrostis scabra, Willd.

Dry meadows and open slopes. Very common, up to 8000 ft. alt. (258, 606, 607, 608).

Agrostis exarata, Trin., var.

Pelican Creek, 8000 ft. alt.; Wooded bogs and along streams. Not common (604).

Agrostis humilis, Vasey.

Common in cool mossy bogs and mountain meadows, 7000-9000 ft. alt. (259, 603).

Agrostis perennans, Tuck.

Lower Geyser Basin (Coulter); Upper Falls of the Yellowstone (Adams).

Cinna pendula, Trin. (*C. arundinacea*, L., var. *pendula*, Gray).

Wooded bogs and streams. East Fork, 8600 ft. alt. Rare (581).

Deyeuxia Langsdorffii, Kunth.

Common in wooded and open mountain meadows and bogs, 7000-9000 ft. alt. (248).

Deyeuxia Canadensis, Hook.

With the preceding (584).

Deyeuxia dubia, Scribn., n. sp.

Meadows, Slough Creek, 6700 ft. alt. (585).

Deyeuxia sylvatica, DC.

Upper Yellowstone Falls (Adams).

Deyeuxia neglecta, Kunth.

Meadows and slopes, from 7000-9000 ft. alt. Generally in rather dry situations (253, 582, 583).

Ammophila longifolia, Benth.

Yellowstone Park (Forwood).

Deschampsia cæspitosa, Beauv.

Dry and moist meadows and slopes, from 7000-9000 ft. alt. Very common (616).

Trisetum subspicatum, Beauv.

Common in meadows, from 7000-9000 ft. alt. At low elevations, in moist or shaded situations (619).

Trisetum subspicatum, Beauv., var. *molle*, Gray.

With the preceding (618).

Trisetum Wolfii, Vasey (*Graphophorum Wolfii*, Vasey).

Moist meadows, generally in the shade, from 7000-9000 ft. alt. Rather frequent and associated with *Deyeuxia Canadensis* and *Bromus ciliatus* (249, 250, 617).

Avena striata, Michx.

Wooded moist meadows and bogs. Slough Creek, 6800 ft. alt.; Soda Butte Creek, 7200 ft. alt. Not common (612).

Danthonia intermedia, Vasey.

Rather common in dry and moist meadows, from 7500-9000 ft. alt. (269, 597).

Danthonia Californica, Boland, var. *unispicata*, Thurb.

Dry rocky open places, Slough Creek, 6500 ft. alt. Rare (596).

Koeleria cristata, Pers.

Common everywhere in dry situations, up to 8000 ft. alt. (260).

Catabrosa aquatica, P. B.

In water, Gardiner River, 5400 ft. alt. Rare (577).

Melica spectabile, Scribn., Proc. Philad. Acad., 1885, p. 45.

Common in rich meadows and on slopes near the upper limit of the "bunch grass" areas, especially from 7000-9000 ft. alt. (268, 601, 602).

Melica Californica, Scribn. Loc. cit., p. 46.

Mud Springs (Adams).

Poa Andina, Nutt.?

Dry open places, Slough Creek, 6700 ft. alt. (631).

Poa tenuifolia, Buckl.

Everywhere over the lower dry areas, one of the principal "bunch grasses," and frequent on subalpine slopes (632, 637).

Poa alpina, L.

From 6500 ft. alt. to alpine. At low elevations in cool, moist situations (627, 628).

Poa Pringlei, Scribn.

In dense tufts in compact dry soil on exposed rocky ridges from 8000-9500 ft. alt. (633).

Poa cuspidata, Vasey, ined.

Dry meadows along Slough Creek, 6500 ft. alt. (636).

Poa Pattersoni, Vasey, ined.

On slides and in crevices of rocks. Soda Butte Creek, 8500 ft. alt. (634).

Poa reflexa, V. and S.

Alpine slopes (274 and 638 in part).

Poa acuminata, Scribn., n. sp.

Common in cold meadows and bogs, and less so on alpine and subalpine slopes from 7000-10,000 ft. alt. (639).

Poa lævis, Vasey, ined.

Sandy bluffs at outlet of Yellowstone Lake, 7800 ft. alt. (643).

Poa Nevadensis, Vasey.

A characteristic species of moist meadows and bogs from 7500-9000 ft. alt. The glaucous form more frequent in bogs (276, 642, 645).

Poa nemoralis, L.

Rather dry meadows and banks from 7000-9000 ft. alt. (275, 640, 647).

Poa pratensis, L.

Meadows and bogs from 5500-8500 ft. alt. Common at low elevations (254, 646).

Poa Vaseyana, Scribn., ined.

Wet places at low elevations. Not common (644).

Glyceria airoides, Thurb.

Frequent on hot spring and geyser formation (271, 595).

Glyceria nervata, Trin.

Rather rare along shaded watercourses. Miller Creek, 7200 ft. alt. (593); East Pelican Creek, 8500 ft. alt. Shoshone Lake (Coulter).

Glyceria nervata, Trin., var. *stricta*, Scribn.

Open bogs. Mammoth Hot Springs, 6200 ft. alt. (594).

Glyceria aquatica, Smith.

Upper Yellowstone Falls (Adams).

Glyceria pauciflora, Presl.

Rather frequent in open and wooded bogs from 7500-9000 ft. alt. (267).

Festuca ovina, L.

Meadows and slopes from 7000-9000 ft. alt. Very common, especially above 8000 ft. alt., in a great variety of forms.

Festuca ovina, L., var. *brevifolia*, Wats.

High alpine summits. Upper East Fork, 10,700 ft. alt. (635).

Festuca confinis, Vasey (*Poa* ? *Kingii*, Wats.).

Rocky open hillsides. Soda Butte Creek, 8500 ft. alt. (578).

Bromus Kalmii, Gray.

Rather common in rich meadows and open woods from 6500-8500 ft. alt. (266, 265, 588).

Bromus breviaristatus, Buckl.

Common over the upper "lunch grass" areas and up to 8500 ft. alt. (264).

Bromus virens, Buckl. (*Ceratochloa grandiflora*, H. B. K.).

Open slopes. Soda Butte, 7000 ft. alt. (586).

Bromus Pumpellianus, Scribn., ined.

Dry open places on the borders of woods. Slough Creek and Soda Butte Creek, 6000-7000 ft. alt. Not common (587).

Bromus ciliatus, L. ?

Shaded bogs and meadows from 6500-8500 ft. alt. (589).

Agropyrum caninum, L.

Common over the "bunch grass" areas (625).

Agropyrum divergens, Nees.

Common with the preceding (622, 623).

Agropyrum tenerum, Vasey.

Generally in more moist situations and at higher elevations than the two preceding species (251).

Agropyrum repens, Beauv.

Pelican Creek, 8000 ft. alt. (624); Upper Geyser Basin (Coulter); Yellowstone Lake (Adams).

Agropyrum Scribneri, Vasey.

Rocky alpine and subalpine ridges and summits from 9000-10,500 ft. alt. Generally distributed, but nowhere very common (270, 620).

Hordeum nodosum, L. (*H. pratense*, Huds.).

Rather frequent in moist meadows from 7500-9000 ft. alt. (247, 598).

Hordeum jubatum, L.

Upper Geyser Basin (Coulter). Yellowstone Park (Forwood).

Elymus Sibiricus, L.

Upper Geyser Basin (Coulter).

Elymus Sitanion, Schult.

Common over the open dry areas up to 7000 ft. alt. (626).

CONIFERÆ.

Juniperus communis, L., var. *alpina*, Gaud.

Rocky bare slopes, up to 8000 ft. alt., especially over the hot spring and geyser areas. Not common.

Juniperus Virginiana, L.

Common over the formation of the Mammoth Hot Springs, with *Pinus flexilis*, and along Gardiner River, for a few miles above its mouth.

Abies subalpina, Engelm.

Common throughout, from 6500-9500 ft. alt.

Pseudotsuga Douglasii, Carr.

Common up to 9000 ft. alt. Forming a scattered growth on the lower and dryer ridges.

Picea Engelmanni, Engelm.

Associated with *Abies subalpina*.

Pinus flexilis, James.

Common on gravelly ridges, from 7500 ft. alt., to the timber line.

Pinus albicaulis, Engelm.

With the preceding, but ranging higher. The timber-line tree.

Pinus Murrayana, Balf.

Common everywhere. Forming 65 per cent. of the forest area.

PTERIDOPHYTA (VASCULAR CRYPTOGRAMS).

ISOËTÆ.

Isoëtes Bolanderi, Engelm.

Muddy and gravelly bottom of lakes and ponds throughout, up to 9000 ft. alt.

Isoëtes pygmæa, Engelm.?

Washed up on the shore of Yellowstone Lake, near mouth of Pelican Creek. Probably deeply submerged.

LYCOPODIACEÆ.

Lycopodium annotinum, L.

Dense woods. East Fork, 8500 ft. alt. Upper Falls of the Yellowstone (Adams). Rare.

RHIZOCARPEÆ.

Marsilia vestita, Hook. and Grev.

Yellowstone Lake (Coulter).

OPHIOGLOSSACEÆ.

Botrychium simplex, Hitchcock.

Grassy meadows near mouth of Pelican Creek, 8000 ft. alt.; Yellowstone Park (Parry). Rare.

Botrychium ternatum, Swartz, var. *australe*, Eaton.

Rather common on hot spring and geyser formation throughout.

FILICES.

Cryptogramme acrostichoides, R. Br.

Rocky places. Slough Creek, 6700 ft. alt.; Obsidian Cañon, 7700 ft. alt.; Shoshone Lake and Lower Geyser Basin (Coulter). Local.

Pteris aquilina, L.

Dry open places, chiefly about the hot spring areas.

Asplenium Filix-fœmina, Bernh.

Wooded cold springs at head of Broad Creek, 8200 ft. alt.

Cystopteris fragilis, Bernh.

Rather common in shaded rocky places.

Woodsia scopulina, Eaton.

Rocky places. Rather common. Obsidian Cañon, 7600 ft. alt.; Mt. Washburne, 8500 ft. alt.; Saddle Mt., 8300 ft. alt.; Upper Falls of the Yellowstone (Adams).

Woodsia Oregana, Eaton.

With the preceding.

EQUISETACEÆ.

Equisetum arvense, L.

Swan Lake, 7400 ft. alt.; Yellowstone Lake (Adams).

Equisetum robustum, Braun.

Hot Sulphur Springs (Adams).

Equisetum hiemale, L.

Swan Lake, 7500 ft. alt.

Equisetum variegatum, Schleicher.

Mammoth Hot Springs, 6300 ft. alt.; Lower Geyser Basin (Coulter).

SUMMARY.

ORDERS.		GENERA.	SPECIES.
5	<i>Ranunculaceæ</i> ,	12	27
	<i>Berberidaceæ</i> ,	1	1
	<i>Nymphaeaceæ</i> ,	1	2
	<i>Fumariaceæ</i> ,	1	1
7	<i>Cruciferae</i> ,	13	26
	<i>Violaceæ</i> ,	1	4
14	<i>Caryophyllaceæ</i> ,	6	16
	<i>Portulacaceæ</i> ,	4	5
	<i>Elatinaceæ</i> ,	1	2
	<i>Malvaceæ</i> ,	2	2
	<i>Linaceæ</i> ,	1	1
	<i>Geraniaceæ</i> ,	2	4
	<i>Rhamnaceæ</i> ,	2	2
	<i>Sapindaceæ</i> ,	1	1
4	<i>Leguminosæ</i> ,	5	28
9	<i>Rosaceæ</i> ,	12	23
8	<i>Saxifragaceæ</i> ,	6	25
	<i>Crassulaceæ</i> ,	2	4
	<i>Haloragaceæ</i> ,	2	2
12	<i>Onagraceæ</i> ,	3	17
	<i>Loasaceæ</i> ,	1	1
15	<i>Umbelliferae</i> ,	9	14
	<i>Cornaceæ</i> ,	1	2
24	<i>Caprifoliaceæ</i> ,	4	6
	<i>Rubiaceæ</i> ,	1	5
25	<i>Valerianaceæ</i> ,	1	2
1	<i>Compositæ</i> ,	38	108
	<i>Lobeliaceæ</i> ,	1	1
	<i>Campanulaceæ</i> ,	1	1
11	<i>Ericaceæ</i> ,	11	17
25	<i>Primulaceæ</i> ,	4	5
25	<i>Gentianaceæ</i> ,	3	5
17	<i>Polemoniaceæ</i> ,	3	13
24	<i>Hydrophyllaceæ</i> ,	3	6
18	<i>Borraginaceæ</i> ,	5	12
3	<i>Scrophulariaceæ</i> ,	9	32

ORDERS.					GENERA.	SPECIES.
		<i>Orobanchaceæ</i> ,			1	2
		<i>Lentibulariaceæ</i> ,			1	1
		<i>Labiataæ</i> ,			4	4
		<i>Plantaginaceæ</i> ,			1	1
		<i>Nyctaginaceæ</i> ,			1	1
21		<i>Chenopodiaceæ</i> ,			4	8
10		<i>Polygonaceæ</i> ,			4	18
		<i>Elæaginaceæ</i> ,			2	2
		<i>Loranthaceæ</i> ,			1	1
		<i>Santalaceæ</i> ,			1	1
		<i>Euphorbiaceæ</i> ,			1	3
		<i>Callitrichaceæ</i> ,			1	2
		<i>Ceratophyllaceæ</i> ,			1	1
		<i>Urticaceæ</i> ,			1	1
		<i>Cupuliferæ</i> ,			2	4
20		<i>Salicinæ</i> ,			2	8
19		<i>Orchidaceæ</i> ,			4	9
		<i>Iridaceæ</i> ,			2	2
13		<i>Liliaceæ</i> ,			9	16
16		<i>Juncaceæ</i> ,			2	14
		<i>Typhaceæ</i> ,			2	2
		<i>Lemnaceæ</i> ,			1	3
		<i>Alismaceæ</i> ,			1	1
23		<i>Naiadaceæ</i> ,			4	7
6		<i>Cyperaceæ</i> ,			3	26
2		<i>Gramineæ</i> ,			29	72
22		<i>Coniferæ</i> ,			5	8
		<i>Isoëtæ</i> ,			1	2
		<i>Lycopodiaceæ</i> ,			1	1
		<i>Rhizocarpeæ</i> ,			1	1
		<i>Orphitoglossaceæ</i> ,			1	2
24		<i>Filices</i> ,			5	6
		<i>Equisetaceæ</i> ,			1	4
					273	657
ORDERS,						69
GENERA,						273
SPECIES,						657

NOTE.—Those orders which form about one per cent. or over of the flora, have numbers prefixed, indicating their approximate rank.

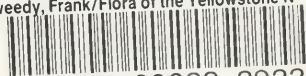


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